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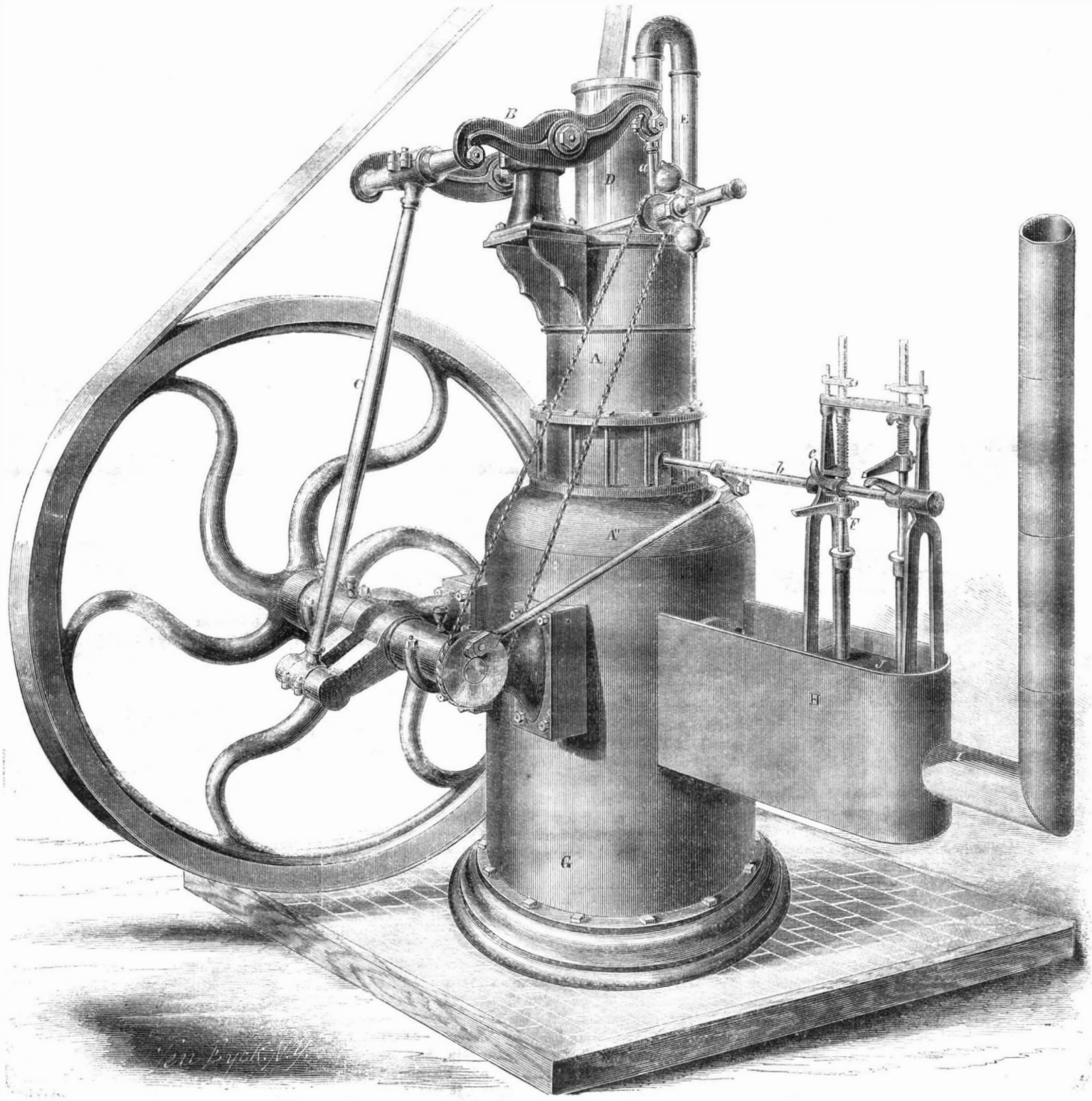

ROPER'S PATENT CALORIC BEAM ENGINE.

The employment of caloric engines has latterly been confined to light duty and to those manufactures which do not require the development of an immense power. They are also coming into favor for domestic and agricultural purposes, as, for example, pumping water, cleaning grain, sawing wood and a multitude of other operations for which they are eminently suitable. They are easily managed, are clean when running, they require no water, and are very economical in respect to fuel; and lastly, though by no means the least consideration in these tight times, is the fact that the rates of insurance are not increased by using them in any building. The one from which our engraving is taken is novel, in so far that it is the first attempt, to our knowledge, to use the general features of a modern beam engine for caloric purposes. The relations of the several parts with reference to each other will, we think, be readily understood by the letters and subjoined description.

The cast-iron cylinder, A, is bolted to the chamber, A″, situated directly over the fire-box and separated from the same by a partition. The pillow block carrying the working beam, B, is bolted to the brackets on the side of the cylinder. The piston of this engine has two side links, *a*, which connect to the two ends of the working beam; through them

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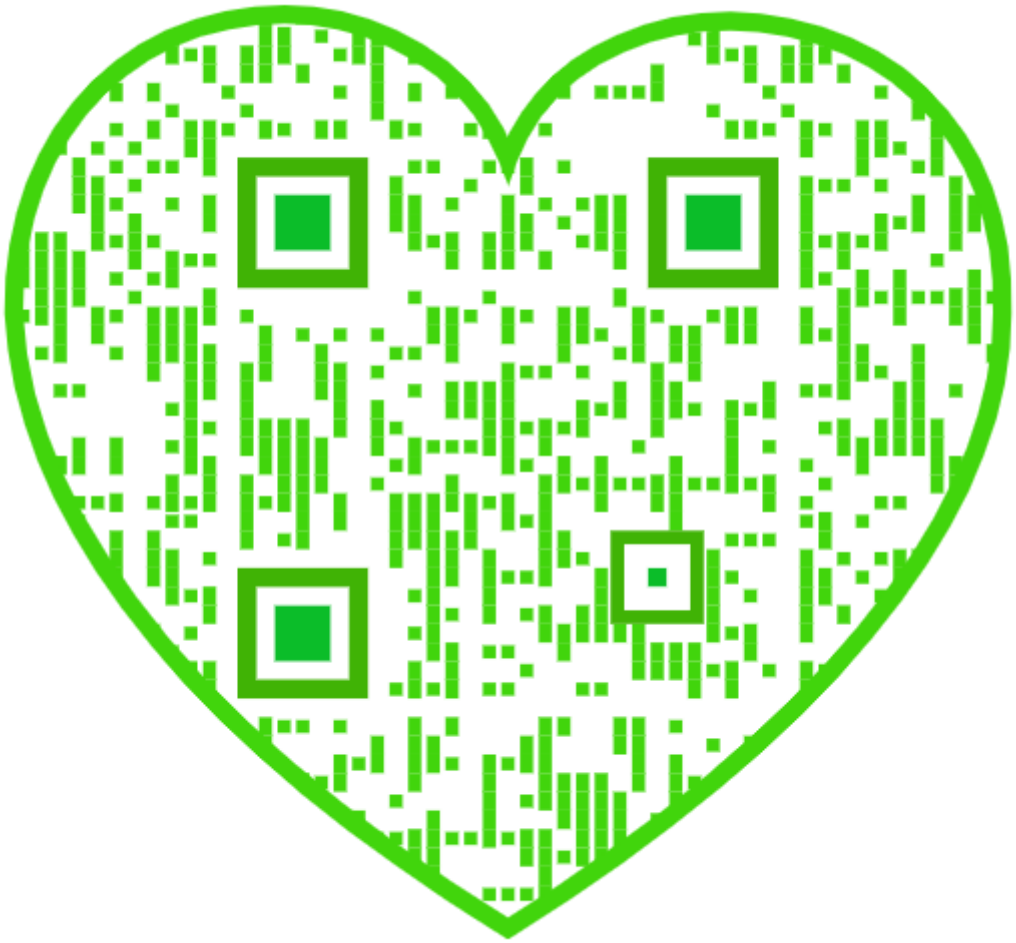

and the beam power is transmitted to the shaft by the connecting rod, C. The air pump, D, is situated over the center of the cylinder and operated by a hollow rod common to both pistons. The siphon-shaped pipe, E, seen issuing from the cylinder at one side behind the air pump, runs down into the cylinder and is there put in connection with the piston, and fire-box below, by means of a telescopic or sliding tube fastened to and moving with the main piston itself. By this means the current of air which enters the piston from the air pump keeps it at a very even temperature. The main shaft has a plate attached to one end which drives the induction and eduction valves, F, through the rockshaft, *b*, and toes, *c*. The doors for supplying the fuel, which are perfectly air-tight, in the furnace, G, are on the opposite side from the reader, and cannot be seen in this view of the engine. There is an opening into this fire-box through which the heated and compressed air passes into a supply pipe in the box, H, connecting with the induction valve, F, a similar contrivance allows the air exhausted from the cylinder to issue through the flue, I. This flue is also the channel through which the coal gases, produced by the burning fuel, find their way to the chimney. A portion of the air chest in which the valves work, is seen at J ; the outer casing, H, is merely a protection to the hot-air pipes. These latter are covered with ashes or other non-conducting material, and the heat thereby prevented from radiating. The box, H, answers the same purpose as the steam jacket on a steam engine. There are, also, upon the other side of the furnace, two small dampers which connect with the upper pipe, E, and change the direction of the air current at the will of the engine-driver, so that the air is directed upward through the burning fuel, or merely heated by passing over the surface, thus expanding its volume to a greater or less degree, as the load on the engine is increased or diminished. This engine is rated at two-horse power ; a cubic foot of air is supplied by the air pump, which is heated at every stroke. The cylinder is sixteen inches in diameter, and has sixteen inches stroke on the piston. The usual number of revolutions is one hundred, but they can be increased without difficulty to one hundred and fifty per minute if necessary. The piston is packed with leather, which is kept from charring by the cool current of air constantly circulating through it when the engine is moving. This engine is similar, in some respects, to an ordinary beam engine, and works almost noiselessly with great smoothness and regularity. The engine from which our engraving was made weighs about 3,000 lbs., and occupies about six square feet of space, and can be readily transported from one part of a building to another. About 70 lbs. of anthracite coal are consumed in working twelve hours. We made no tests to ascertain the force exerted by this engine, but so far as a mere conjecture goes we should think it exceeded the power it was estimated at.

This caloric engine is the invention of S. H. Roper, of Boston, Mass., and is covered by several patents recently issued. Further information respecting prices, &c., may be had by addressing Crosby, Butterfield & Haven, 22 Dey street, New York, or 47 Pearl street, Boston, Mass., where these engines can be seen in operation.

The Southern Passage in Winter.

We have frequently advised ship-owners to instruct their captains bound from Europe to our Northern ports, to take the Southern route in winter. By keeping the run of Western passages made in high latitudes, we have been enabled to record many severe disasters, which might have been avoided if the sufferers had gone South. We recur to this subject again because we have now before us the reports of several ships which have crossed the Atlantic by the Northern track, and of one which followed the Southern, as they will show the value of our advice. The ship *Lammergier*, Capt. Watts, sailed from London, passed Deal Nov. 22d, and arrived at New York by the Northern passage on the 19th inst. She experienced severe gales and sprang her mainmast. The ship *Charlotte A. Stamler*, Capt. Theobald, from Liverpool Nov. 28th, also arrived at New York on the 19th inst., and reported bad weather. On the 23d ult., in lat. 46 20, lon. 41 50, she saw a dismasted ship and hove to during the night to render her assistance ; but the next day she was not in sight. She may have sunk. The ship *Success*, Capt. Chase, also from Liverpool, sailed November 20th, and arrived at New York 19th inst. She lost her main yard, sprang the fore yard, and had nearly all her sails blown away. All these vessels made their passages in high latitudes. By way of contrast, we refer to the passage of the ship *Centurion*, Capt. Zerega. She sailed from Flushing on Dec. 4th, and arrived at New York 19th inst.; and though twelve days were consumed in working down the English Channel, she beat all the others. Capt. Zerega reports that he "made the Southern passage and had fine weather." We have often shown the advantages of the Southern passage during the winter in general terms, and by reference to well-known facts ; and will continue doing so, in the hopes that it may have the desired effect. The intense suffering and heavy loss of property incurred by adhering to the Northern route can be, and, therefore, ought to be avoided.—*Commercial Bulletin.*

Prizes of the Paris Academy of Sciences.

The following are the prize questions proposed by this body at its last great annual meeting :—1. Mathematics.—To discuss with care the observations of tides made in the principal ports of France, and compare them to the theory (3,000f., papers to be sent in before the 1st of June, 1865) ; to re-examine the phenomena of capillarity, and compare them to the results of calculation (3,000f., 1st of April, 1864) ; to improve the geometrical theory of polyhedrons (3,000f., 1st of January, 1864) ; to establish a complete and rigorous theory concerning the equilibrium of floating bodies (3,000f., 1st of July, 1864). 2. Mechanics.—To introduce some important improvement in the application of steam to the imperial navy (6,000f., 1st of Nov., 1863). 3. Bordin prizes.—On some questions of optics, at the candidate's choice (3,000f., 1st of July, 1864). To determine the direction and relative intensities of electric currents produced by various thermo-electrical substances (3,000f., 1st of July, 1864). To effect some improvement in the mechanical theory of heat (3,000f., 1st of July, 1864). 4. Natural Philosophy.—On the comparative anatomy of the nervous system of fish (3,000f., 1st of September, 1864). To study the changes effected during germination in the constitution of the tissues of the embryo and perisperm (3,300f., 1st of April, 1864). On the production of hybrid animals by means of artificial fecundation (3,300f., 30th of Sept., 1863). 5. Medicine.—To trace the history of Pellagra (5,000f., 1st of April, 1864). 6. Medicine and Surgery.—On the application of electricity to therapeutics (5,000f., 1st of April, 1866). 7. Surgery.—On the preservation of members by preserving the periosteum (the Academy offers 10,000f.; the Emperor also 10,000f., 1st of April, 1866). 8. Bordin prizes of 3,000f. each, to be sent in before the 31st of December, 1863 :—On the distribution of the vessels of the latex in the organs of plants ; on the anatomical history of coral and other zoophytes of the same family ; on the structure of the stems of plants, with a view to determine their respective families.—*Mechanics' Magazine.*

Children's Arms and Legs.

A distinguished physician who died some years since in Paris, declared :—"I believe that during the twenty-six years I have practiced my profession in this city, twenty thousand children have been carried to the cemeteries, a sacrifice to the absurd custom of exposing their arms naked." We have often thought if a mother was anxious to show the soft white skin of her baby, and would cut a round hole in the little thing's dress, just over the heart, and then carry it about for observation by the company, it would do very little harm. But to expose the baby's arms—members so far removed from the heart, and with such feeble circulation at best—is a most pernicious practice. Put the bulb of a thermometer in a baby's mouth, and the mercury rises to 90°. Now carry the same to its little hand ; if the arms be bare and the evening cool, the mercury will sink to 40°. Of course, all the blood which flows through those arms must fall to within 30 or 40° below the temperature of the heart. Need we say when these currents of blood flow back into the chest, the child's general vitality must be more or less compromised? And need we add that we ought not to be surprised at its frequent recurring affections of the tongue, throat or stomach? We have seen more than one child with habitual cough and hoarseness, or choking with mucus, entirely or permanently relieved by simply keeping its arms and hands warm. Every observing and progressive physician has daily opportunity to witness the same cure.—*Lewis's Gymnastics.*

Gold.

There are good reasons for believing that gold was the first metal with which man became acquainted. Its peculiar properties render it the best for the purpose of being worked by a primitive people. Gold is the only metal which is found in a metallic state, such as we see it used in the arts and manufactures. The process of extracting all the other metals from their matrix or ore is so tedious and difficult that without gold it is probable our forefathers would have had no metals at all to use. We who live at this period of the world's history can well believe how little advancement could be made in civilization without a metal of some kind. Now those qualities which we recognize as metallic in the highest degree are possessed by gold, and it is thus we see, even in this single instance, a proof of the Creator's wisdom, the adaptation of a means to an end. Gold, the most easily worked of all metals, the most imperishable, the most brilliant and attractive, was the first that was given to man. No other metal could have served the purpose so well as the one we find him first possessed of. No wonder gold is typified in the Scriptures as the purest metal ; no wonder that it was chosen as the means (in the shape of coin) of representing the products of labor, that man should select what age after age has proved to be the most fitting thing for this purpose. As an assurance to us that the supply of gold shall be adequate to our wants, this metal has been found in the ratio of the increase of the human family. It is diffused over the whole earth, and has acted as a stimulus to man to visit regions previously uncultivated. The wilds of Australia and California have thus been peopled in our day in the same way that the Spaniards peopled South America years ago.—*Septimus Piesse.*

The Ice Crop.

Some apprehensions have been expressed by parties, within our hearing, that the ice crop would prove a failure this year on account of the mild weather. From the appended paragraph, cut from the Boston *Cultivator*, it will be seen that, judging by former seasons, no anxiety is necessary :—

"On Monday a company began to cut ice on Spy Pond, in West Cambridge. It was about a foot thick. At the beginning of the week there was an abundance of ice from 10 to 15 inches in thickness on the ponds within 30 miles of Boston. It is stated that the ice crop of New England has never failed. Twenty years ago the ice-dealers did not secure their crop in December when the ice was a foot thick, preferring to wait for 18 inches. But the latter part of the winter was warm, and the ice was not so thick again that season. An ice man states that, five winters ago, no ice was gathered in this vicinity until after the 22d of February. So great was the supply that year, however, that many ice-houses were not emptied of their contents during the following season."

UNIQUE SPELLING.—We frequently receive some ingenious combinations of the vowels and consonants in our office, from correspondents whose opportunities for improvement have been restricted ; but we think that this specimen, which we cut from an exchange, rather exceeds anything we could produce. It speaks for itself :—

"I Wish to know hif you coud find mee a goob has i ham a prachisel Machines And searved my time in Hengland to the coton mules and loomes & i will come to work for 12s. per day i can take and fixxe A pare of mules up My sealfe My hage is 23 years old please to rite by Return of poste."

THE well-known Soho manufactory, at Birmingham—once the working place of Watt, Rennie, Flaxman, Murdoch, and other distinguished inventors and machinists—is to be demolished for "improvements."

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Commercial Affairs.

DRY GOODS.—Cotton has reached the extraordinary rates of 90 and 93 cents per lb. for Middlings. We have been informed that these prices are higher than those which existed during the war of 1812 with Great Britain. As a result of such prices for the raw material, domestic manufactured cotton goods have advanced in price from five to eight cents per yard during the past two weeks. Heavy Sheetings are quoted at from 36 to 40 cents, cash. Mediums are generally quoted at 39 cents. Heavy Shirtings are quoted at 30 to 32 cents, and light do. at 24 to 26 cents. Bleached Sheetings and Shirtings vary from 26 to 40 cents. Drills, both brown and bleached, have advanced to 35 cents. Cotton Flannels are quoted at 32 to 36 cents. Cotton Jeans range from 25 to 32½ cents. Printing Cloths, from 16¼ to 17½ cents, for 64 by 64. Prints are active for good styles, and prices range from 21 to 27½ cents. Ginghams sell at 24 to 25 cents. Foreign Goods are also active, and all kinds adapted for the spring trade are advancing.

PETROLEUM.—From January 1st up to the 30th ult., no less than 1,556,117 gallons of petroleum have been shipped from New York, and in addition to this there were exported from Boston 217,298 gallons; from Philadelphia, 129,513 gallons; from Baltimore, 55,369 gallons; and from Portland, Maine, 47,466 gallons—total 449,646 gallons—making a total export from the United States since the 1st of January of 2,005,763 gallons. The petroleum trade, in its sudden rise and rapid progress, is the most extraordinary on record. The importation into London last year, was 28,335 barrels; Liverpool, 39,309 barrels; Glasgow, 650 barrels. Total exports to Europe from America, 257,914 barrels, or 10,318,658 American gallons.

SALTPETER.—This substance is the prime element in the manufacture of gunpowder. The total import for 1862, was in Boston 55,222 bags; New York, 31,751; Philadelphia 2,300—total 89,273 bags, of which 85,273 bags came from the East Indies, the rest from Europe. In addition to this there were 40,000 bags imported into Philadelphia from Europe on Government account. There are 29,990 bags of this substance now on its way to America from Calcutta. It has been selling at 15 cents per lb.

Remarkable Trial of Steam Fire-engines.

We would call the attention of our steam fire-engine builders, and others interested, to an advertisement on page 95 of this paper, respecting a trial of steam fire-engines which is to occur in London, England, on June 1, 1863. The premiums offered are $1,250 and $500 for the best and second-best engines of each of two classes—one class over 30 cwt. and the other below that weight or not exceeding it. The points in competition will be rapidity in raising and generating steam, facility of drawing water and the volume thrown to any distance. The affair is to be under the supervision of the Duke of Sutherland, assisted by several of the most eminent engineers in England; and it is certain that everything will be done that experience can suggest, to render the trial interesting and satisfactory to all. We earnestly hope our steam fire-engine makers will give this matter special attention. Here is a chance for some builder to obtain a world-wide reputation, and we hope that they will not suffer the occasion to pass unimproved. Mr. Lee has the only American steam fire-engine abroad, that we know of, and his does good work there; but we should like to see all of our inventors on hand with their several machines.—the Amoskeag, the Portland Machine Company, the Holley rotary, the Messrs. Cowings, and any others that may be engaged in making machinery of this particular kind. From what we saw at Troy in the trial which took place there in 1860, we have no fear for the result so far as our engines and pumps are concerned. In all probability every known kind and variety of steam fire-engines will be present at this trial, and it would seem to be an opportunity to gain a wide renown, such as seldom occurs.

WOULD you eat healthful dinners? Eat slowly. Would you eat social dinners? Eat slowly. Would you eat relishable dinners? Eat slowly. Please suffer a short word of exhortation—eat slowly.

Double-bow Naval Steamboats.

The new double-bow paddle-wheel steamer *Mendota* was launched on the 30th ult., at South Brooklyn. Her length is 240 feet, breadth 35, depth 12 feet. She has four ports on each side for carriage guns, and a long port on each side at the ends for pivot guns. The meaning of double-bow is a vessel like a river ferry-boat, which has a rudder at each end for steering both ways. This is the second vessel launched of a fleet of twenty of such boats, contracted for by the Government. She will be driven with one engine, having a cylinder 58 inches in diameter, with a stroke of 8¾ feet. Her two boilers will have iron vertical tubes called "Martin's Patent," and she will also be furnished with Sewell's surface condensers and Stevens's cut-off. What a variety of vessels we have belonging to our navy! There are regular-built frigates, iron-clad wooden frigates, *Monitor* iron gunboats with revolving turrets, river gunboats with and without turrets, screw boats and paddle-wheel boats, double-bow boats and single-bow boats, and a number of others whose styles baffle description. The following are the names, condition and places where the fleet of double-bow boats are being built:—

Vessel.	*Condition.*	*Where Building.*
Ascutney	Nearly fit to launch	Newburyport.
Agawan	Keel laid	Portland.
Chenango	Ready to launch	New York.
Chicopee	Progressing	Boston.
Eutaw	Keel laid	Baltimore.
Tasco	Keel laid	Baltimore.
Lenapee	Nearly finished	New York.
Melabesett	Progressing	Boston.
Mingo	Keel laid	Bordentown, N. J.
Massassoit	Half built	Boston.
Metacomet	Half built	New York.
Mendota	Launched	Brooklyn.
Maskwan	Half finished	New York.
Otsego	Half finished	New York.
Pontiac	——	Philadelphia.
Sassacus	Launched	Portsmouth.
Shamrock	Nearly finished	New York.
Wateree	Keel laid	Chester.
Wyoming	Progressing	Philadelphia.
Pontoosac	——	Portland, Maine.

Manufacturing Items.

The American Screw Company, Providence, R. I., at its annual meeting on Jan. 20th, passed a vote authorizing its directors to erect, at a cost not exceeding $500,000, a new building to accommodate its entire business, which is now subject to the disadvantage of being conducted in two establishments at opposite extremes of the city. The location of the new building is left to the judgment of the directors.

Business in Taunton, Mass., is reported to be very good. The establishment of Mr. Wm. Mason at present employs not less than five hundred and fifty hands, and Mr. Mason has under contract, in addition to his very extensive gun contract, fifteen locomotives for various roads in different sections of the country.

One of the mills in Lewiston, Maine, is reported to have made, within four months, about $500,000 worth of goods.

A portion of the Portsmouth, N. H., Steam Factory will be soon run for the manufacture of spool cotton, and twisters are to be put up at once in the mill.

The January dividends of the two great fire-arms companies in Hartford, Conn., viz: Colt's and Sharp's, together amounted to nearly $1,000,000.

Eli Whitney has erected another new building at his gun manufactory in Whitneyville, Conn., the demand for his muskets being greater than the capacity of his works. It is 60 by 35 feet, and three stories high. Near four hundred workmen are now employed by Mr. Whitney and various contractors doing business at his establishment.

THE Commissioner of Patents is in want of two copies of the following numbers of the SCIENTIFIC AMERICAN, new series:—Volume VI.—Nos. 7, 8, 9, 10, 11, 12, 13, 16, 19, and 23; two of each number wanted. Volume VI.—No. 4—one paper wanted. We are unable to supply the above numbers; but if any of our readers can do so and will address them to the Commissioner of Patents, Washington, we have no doubt that he will return the compliment by forwarding to them some copies of the new official reports, for the making-up of which said papers are needed.

The British Navy.

The annual official return of the number, name, tunnage, armament, and horse-power of each vessel, both steamers and sailing ships, composing the British Navy, was published on the 1st of January, under the authority of the Lords of the Admiralty. Including a numerous fleet of gunboats the navy of England, on Jan. 1, numbered 1,014 ships of all classes. Of this number there are 85 line-of-battle ships, mounting from 74 guns to 131 guns each, according to their rating; 39 of from 50 guns to 72 guns each; 69 frigates of from 24 guns to 46 guns each, most of which are of a tunnage and horse-power equal to a line-of-battle ship; 30 screw cervettes, each mounting 21 guns; and upwards of 600 frigates and vessels of all classes mounting less than 20 guns. In addition to the above there is a fleet of 190 gunboats, each mounting two heavy Armstrong guns and of 60-horse power, besides a numerous squadron of iron and wooden mortar vessels built during the Russian war, and now laid up at Chatham. At present there are 43 vessels under construction for the Admiralty at the various public and private dockyards, many of which will be completed and launched during the present year. The iron vessels building are the *Achilles* (50) 6,079 tuns, 1,250 horse-power, at Chatham; the *Northumberland* (50) 6,621 tuns, 1,250 horse-power, at Millwall; the *Minotaur* (50) 6,621 tuns, 1,250 horse-power, at Blackwall; the *Agincourt* (50) 6,621 tuns, 1,250 horse-power, at Birkenhead; the *Hector* (32) 4,063 tuns, 800 horse-power, at Glasgow; the *Valiant* (32) 4,063 tuns, 800 horse-power, at Millwall; the *Tamar* (3) 2,812 tuns, 500 horse-power; and the iron-cased frigate *Royal Alfred*, (34) 3,716 tuns, 800 horse-power, at Portsmouth; the *Ocean* (34) 4,045 tuns, 1,000 horse-power, at Devonport; the *Zealous* (34) 3,716 tuns, 800 horse-power, at Pembroke; and the *Favorite* (22) 2,186 tuns, 400 horse-power, at Deptford. In addition to the above, the *Royal Sovereign*, 3,968 tuns, 800 horse-power, is being converted into a cupola ship, and the *Enterprise*, building at Deptford, for a shield-ship, on the new plan submitted to the Admiralty. During the year 1862, the vessels launched at the several dockyards were the *Caledonia* (50) 4,045 tuns, 800 horse-power, iron-cased frigate, at Woolwich; the *Royal Oak* (34) 3,716 tuns, 800 horse-power, iron cased frigate, at Chatham; the *Prince Consort* (34) 3,716 tuns, 800 horse-power, iron-cased frigate, and 31 wooden vessels of various sizes.—*Mitchell's Steam Shipping Journal.*

MISCELLANEOUS SUMMARY.

BY the latest news from Europe we learn that the trade in petroleum increases with extraordinary rapidity, and it has become of great importance, not only to England but the continent. The Minister of the Interior, in Belgium, has declared that it is *not* to be considered as one of the articles of inflammable merchandise to be held essentially dangerous.

THE Confederate States are much puzzled for a suitable design for their national seal. A writer declares that the inventive talent of the Confederacy has not been equal to the emergency, and urges Mr. Mason to see what he can do for the cause in England.

LARGE sums of money are expended annually in obtaining the fertilizing material, guano, from distant islands in the sea; while in our cities vast quantities of materials embracing the same properties are allowed to pollute the sewers and flow unreclaimed into the sea.

REPORT OF THE SANITARY COMMISSION.—We have received a report of the transactions of the Sanitary Commission, with reference to the care of sick soldiers, &c., and shall notice the same at an early date. Much other interesting matter is also unavoidably excluded.

MRS. BETSY TENNY, of Antrim, N. H., wove fifty yards of cloth in a hand-loom last autumn. She is 72 years of age.

IN Georgia the powder of the flowers *pyrethrium roseum* are employed to destroy noxious insects, fleas and bugs. It is not the least injurious to man.

DURING the month of November last 12,000 bales of cotton were shipped from England to the United States.

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PHYSIOGRAPHIC GEOLOGY.

Physiographic geology is one of the divisions of the general science of geology. The following is condensed from Professor Dana's new and incomparable "Manual of Geology :"—

Physiographic geology embraces a general survey of the earth's surface features. The earth is a sphere flattened at the poles, and from this it is inferred that it was at one period in a soft condition, as the flattening at the poles is just equal in amount to that which would be produced in revolving a liquid globe of the same size and density as the earth. On the surface of the globe the proportion of water to dry land is as 8 to 3, and the proportion of land north of the equator is three times as great as that at the south. The zone containing the largest proportion of land is the north-temperate. In the northern hemisphere the land covers 38,900,000 square miles; in the southern 13,600,000 square miles. Out of the 197,000,000 square miles which make up the entire surface of the globe, 144,500,000 are water. The oceanic depression is a vast sunken area varying in depth from a few feet to about 50,000 feet. The border of the ocean on the North American coast, off New Jersey, extends out for 8 miles and is shallow, not exceeding 600 feet deep; then it dips down at a steep angle to a great depth. The average breadth of the Atlantic ocean is 2,800 miles; that of the Pacific 6,000 miles; and the mean hight of the entire continent of America above the level of the sea is 930 feet; South America is higher than North America. There are three ranges of American mountains, namely, the Appalachians, Andes and Rocky Mountains. The latter is not a narrow barrier between the East and the West, as it appears on the maps, but a vast gentle swell of the surface having a base 1,000 miles in breadth, the slopes being diversified with mountain ridges and plateaus. On the eastern side they rise at the rate of only ten feet to the mile, continuing for 600 miles; on the west they slope for 400 miles; their passes have a hight of from 6,000 to 10,000 feet, while ridges rise above them to an elevation of 14,000 feet. In the Andes the eastern slope rises about 60 feet in the mile; the western about 150 feet, and their passes are at hights varying from 12,000 to 16,000 feet, the highest peak—Sorata in Bolivia—is 25,290 feet. In the Appalachians—which includes all the mountains from Georgia to the Gulf of St. Lawrence—the mountain mass is much smaller. In North Carolina their highest peaks are from 6,000 to 6,800 feet. There are several elevated plateaus on the American continent, such as the great Mexican plateau in which the city of Mexico lies, which is about 7,482 feet in hight; and the city of Potosi is situated on a plateau at 13,330 feet elevation. Plateaus and mountains are the sources of rivers, of which there are several great river systems on this continent. The interior of the United States belongs to one river system—that of the Mississippi. Its tributary streams rise on the west among the snows of the Rocky Mountains; those on the north in the central plateau west of Lake Superior; and those on the east in the Appalachians from Western New York to Alabama. The St. Lawrence is another river system, commencing in the head waters of Lake Superior, and it embraces the great lakes, with their tributaries and the rivers of Canada flowing eastward to the Atlantic ocean. Mackenzie river is the central trunk of another system—the northern; and the Saskatchewan is a minor system flowing into Hudson's Bay.

Continents in general have elevated mountain-borders and a low or basin-like interior, and the higher border faces the larger ocean. On the side of the Pacific ocean are the high Rocky Mountains, on the Atlantic side are the comparatively low Appalachians, while between the two is the great interior plain. On the north is the small Arctic ocean, which has no distinct mountain chain facing it. In the mountain ranges of eastern North America there are curves like those of eastern Asia. The Green Mountains run nearly north and south, but the continuation of this line of hights across New Jersey into Pennsylvania curves around gradually to the westward, and the Alleghanies in their course from Pennsylvania to Alabama and Tennessee have the same curve. An outer curving range also borders on the ocean extending from Newfoundland along Nova Scotia, then it becomes submerged and forms the sea-bottom of south-eastern New England and Long Island. Between this range and the Green Mountains lies one of the great basins of ancient geological times, while to the westward of the Green Mountains and the Alleghanies was the grand interior basin of the continent. These two basins were to a great extent distinct in their geological history and apparently independent in their coal deposits and some other formations.

The fertility of a country depends upon its rains. In South America the annual fall of rain is 116 inches; in the temperate zone of the United States it is 44 inches; in Europe only 32 inches. America has been styled by Professor Guyot the "forest continent." The waters of the Gulf of Mexico are a provision against excessive drought to the adjoining continent. Warm, moist breezes from the Gulf flow northward and are condensed into rains in the valley of the Mississippi, which is thus provided with the elements of perpetual fertility. This part of the American continent has already become the granary of England as well as of the United States.

VALUABLE RECEIPTS.

Copal Varnish.—Many difficulties seem to attend the manufacture of this varnish, and lately we have received several communications requesting information on the subject. The following extract is taken from an article published in *Dingler's Polytechnic Journal*, a German publication, and written by Professor Heeren. He says :—"There is no difficulty in dissolving copal in fatty and volatile oils when the resin has been previously fused; by this process, however, a more or less distinct coloration is produced, and the natural hardness of this fine resin is injured. It has therefore been often attempted to dissolve copal without previous fusion; but, as is well known to all who have occupied themselves with this question, great difficulties have been found in effecting the solution. Directions have been given to soak the pounded copal in ether or ammonia until it swells up into a gelatinous form, and then to dissolve it in strong alcohol; but this process never succeeded, though it was tried repeatedly. Others recommend hanging the copal in a small bag in a retort, in which absolute alcohol is gently boiling. This method also failed in producing even a tolerably-concentrated varnish." The best prescription appears to the author to be that given by Freudenvoll in his treatise on the preparation of varnishes. According to him, 4 ounces of West Indian copal are dissolved in a mixture of 4 ounces of oil of turpentine and 6 ounces of alcohol of specific gravity 0.813: or a mixture of 4 ounces of sulphuric ether, 4 ounces of oil of turpentine, and 4 ounces of alcohol of specific gravity 0.851. When engaged in testing this process, which gave very good results, the author found a small variation, which he describes as follows, particularly efficacious :—"Two sorts of copal occur in commerce, the East and West Indian. The former is usually in small, irregular, rounded pieces, with a finely-verrucose surface, the resemblance of which to the skin of a goose has obtained for it the name of goose copal. It is of a somewhat yellow color, and is preferred for the manufacture of oily copal varnish, because it acquires less color by fusion than the West Indian. The latter does not possess a warty surface; it is very pale in color, often nearly colorless, and occurs in large irregular fragments, partly with a rounded surface and partly with a shelly fracture."

"West Indian copal only can be employed in the following solution, the East Indian forming only gelatinous lumps, but never a solution. The solvent is a mixture of 60 parts by weight of alcohol of specific gravity 0.813, 10 parts by weight of sulphuric ether, 40 parts by weight of oil of turpentine, in which 60 parts of copal are to be dissolved for the production of a varnish of an oleaginous consistence. Solution takes place, even in the cold, without any previous gelatinous swelling of the copal; but it is effected much more rapidly with the assistance of a gentle heat. As, however, single pieces are often found in the West Indian copal, which instead of dissolving only swell up in the fluid, by which the rest of the solution is spoiled, it is advisable to select only the large and perfectly clear pieces for the purpose of varnish-making, and to test each first of all as to its solubility. This little trouble is richly repaid by the certainty of the result. To test this quality, a small splinter of the copal is put into a small test-tube; a little of the solvent fluid is then poured in, and the whole is heated. If the copal dissolves completely in a few minutes without becoming gelatinous, it is good. When the desired quantity of good copal has been got together in this manner, it is to be pounded to a tolerably fine powder, which is to be put into a glass retort or flask, the necessary quantity of the solvent added, and the whole heated and shaken until solution is effected. To clear the varnish, which may appear somewhat dull, from dust or other impurities, it may be allowed to stand a long while until these settle; or if it be desired to effect this quickly, it may be filtered through blotting-paper, placed as a filter in a glass funnel; the filter must not project above the edge of the funnel, so that the latter may be closed by a glass plate laid over it. The passage of the thick varnish is of course very slow, but the varnish is obtained perfectly clear in this manner; and if the copal employed was very clear, it is nearly colorless. It dries rapidly, but like all turpentine varnishes, it retains a slightly sticky surface for some days."

Fire Gilding for Watch Movements.—All the brass work of watches are gilt, otherwise they would soon tarnish and become useless. The following is one mode of fire gilding such articles. First, dissolve gold in aqua-regia (a mixture of acquafortis and muriatic acids), then precipitate the gold by adding copperas to the solution. The gold powder which falls to the bottom of the vessel is then washed with water and dried, and amalgamated with mercury so as to make a paste. The plates and wheels of the watches are well cleaned, and dipped in dilute nitrate of mercury, until they assume a whitish appearance, when the amalgam of gold and mercury is spread over them in a thin coat, then they are heated over a clear charcoal fire. When it is observed that the mercury is passing off by evaporation, take and brush them softly, then heat them again and brush as before until the mercury disappears entirely. After this they are finished with a fine scratch brush. If some very fine filings of silver are mixed with the amalgam, they will leave little projections on the surface of the articles, and give them the appearance of frosted work, so much admired by watch-makers.

Muriate of Zinc in Soldering.—A correspondent sends us the following as his method of using the muriate of zinc in soldering :—"The muriate of zinc is made by dissolving zinc in commercial muriatic acid, permitting the acid to take up the full equivalent of the metal. It is used as a flux in soldering metals, and in applying it, copper and brass that are not very dirty need no scouring at all, but can be soldered as easily as tin plate with resin. The same may be said of gold, silver, lead, and any other metal, except iron, which must be brightened first; also zinc, for which use pure muriatic acid only. For soldering new tin plate, about an equal quantity of water may be added without impairing its efficiency; wipe off with a damp cloth, and you have a stronger and neater seam than can be made with resin."

An American Custom.—A Bordeaux paper says:—"On the Fourth of July (inaugurated by Lafayette) there exists a curious custom in America. As the clock strikes twelve, every man and boy, and as many women and girls as can, set to work to whistle 'Yankee Doodle,' and which continues for precisely ten minutes. It may be fairly computed there are thirty millions of people sibilating simultaneously. The effect is very curious."

[Precisely. So also is the "fact" that the Fourth of July was inaugurated by Lafayette.—Eds.]

Woolen goods are taking the place of cotton fabrics to a large extent, for many articles of clothing, among the working classes of Europe, just as they have lately done among ourselves. Flannel outer shirts are now worn by thousands of persons who would have scorned to wear such articles two years ago.

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Correspondence

Our Steam Navy—Mr. Dickerson's Reply.

MESSRS. EDITORS :—In your paper of the 24th inst., I find three columns under the title of "Our Steam Navy," in which you devote a small space to the task of vindicating the Navy Department from the charge of ignorance and fraud which I have made against it, and a large space to the easier task of proving that I am not infallible as an engineer, but "have my little errors in common with the rest of humanity." As an American citizen, contemplating the possibility that our country may be precipitated into a foreign war, I sincerely regret that you have not been able to do more for the Navy Department than you have accomplished; my qualifications as an engineer are of no importance to the country. But as a scientific editor you have been exceedingly unfortunate in selecting your facts and your arguments (although no doubt they are the best the case admits of) to sustain you in either branch of your undertaking. It is a very important question—the *future* of our navy—Mr. Editor, which ought not to be mixed up with any such unimportant one as the skill of some private person who is not engaged in building our ships; and that question, permit me to say, you do not state fairly.

You say "Mr. Isherwood has designed some engines for the United States Navy *which work steam expansively*, but not at as high rates as Mr. Dickerson thinks economical and proper," and you would have your readers suppose that it is a mere question of *degree* and not of *principle*. But this is not the case. The real question is whether the engines of the navy shall be worked by *an independent cut-off*, or whether they shall have only a single slide, *without any independent cut-off*; which is a very different question from the one you think it best to do now, in order to confuse the matter you propose. The whole question is fixed in records, and unfortunately for the country, in iron and steel; and it cannot be evaded by any pretence that we differ only in degree and not in principle. Mr. Isherwood thus states the point in his report to the department signed by himself, Zeller, Long and Stimers (p. 37), "cutting off steam at $\frac{7}{10}$ths of the stroke of the piston is *scarcely recognized as working it expansively*;" and all his engines are made without the means of working it *expansively*, as that term is "recognized" among engineers, that is, *without any independent cut-off*. All the old navy ships have that appendage; all merchant ships have it; all the navies of Europe have it; and no engines, except locomotives, which are the most costly in fuel of any engines, are without it, and except in some small boats made for some cheap and temporary purpose, where power, speed, or fuel, are of no consequence. Now Mr. Editor, will you tell your readers that its anything less than *gross ignorance* to put such a thing as a common locomotive engine, made large, into a steamship? Will you tell them that such a machine, compared with one which *has an independent cut-off*, and is proportioned to work expansively, is anything but a perfect failure? I think not, sir! You perhaps can do some good now by speaking out the truth; will you not do it? I notice that you don't once say that these engines of Isherwood are right in your whole three columns. If you think so, you ought to say it; if you don't, you ought not to assail me for agreeing with you and endeavoring to arrest the mischief.

Your first statement to help Isherwood is that numerous vessels of all classes, from the *Persia* down, use slide valves successfully. How does that help the Navy Department? It is true, just as you state it; and in proportion to the certainty and universality of the truth, is the failure of Isherwood to make his *slide valves work successfully* disgraceful to him and to the country. If there were any difficulty about it, of course I should not assail a man who did no better than others; but when it is so simple a problem, as that no one but him fails to work it out successfully, how can you and I hold our peace when we see our navy ships tied fast to the dock, because their slide valves *won't* work successfully? You propose to state the other side of the question, which is that *some* of these ships have not cut their valves; but you do not deny that many and the most important ones have. Is this a justification of Isherwood—that he has not ruined all the ships, but only some of them? It is bad enough to put locomotive engines into a steamship; but when they are so made that they won't work without destroying their valves, it is too much to bear patiently.

You next state that the *Bienville* can go *three hundred and fifty knots a day*, which is faster than ships I have built can go. Well, sir, suppose this was so, how does that help the navy ships, which cannot go within two knots an hour as fast? You are only proving my case stronger than I made it. The *Bienville* has *an independent adjustable cut-off*, and works steam expansively. If she did not, she would be no faster than Isherwood's boats. It is of no consequence who made her—the *fact of her existence* is a reproach to the navy. If her plans are the best, use them; but in the name of common sense do not attempt to vindicate the Navy Department for *not using an independent cut-off* by citing the case of one ship which has an independent cut-off of one sort, going faster than some other ship which has an independent cut-off of another sort.

As you seem to think it important to assail me, I will answer for myself a few words. The *Hu-Quang*, which is in China, you complain of as not a fair specimen of American engineering skill. Why not? She went there in about twelve days *less* running time than *any other American steamer ever did*; she carried English news *viâ* New York to the South Pacific, in advance of *the English steamer direct*; she ran across the ocean, from New York to Cape de Verde, which is 2,900 miles (only 125 less than Liverpool), in ten days and seventeen hours, which was three days less than any other American steamboat ever did it; she ran as fast as any other American steamer *of her class* with about *half* the fuel; and she is the *fastest boat in the world of her class*. Her fuel was 23 tuns per day, as you state, but with it she made 900-horse power, which is only $2\frac{3}{10}$ lbs. of coal an hour per horse-power.

Then your information about the *Keang-Tsi* is equally unlucky for you. How my valve-gear worked on that ship in comparison with the other (*both* having *independent cut-off's*, however), you can see by looking at your own report of a trial, published in the SCIENTIFIC AMERICAN of the 15th of March last. My plans were put on in opposition to the wish of the engineer driver, and of all the subordinates of the owner, Mr. Forbes. They were used all the way to China, and the ship went *three days* quicker than ever had been done at that time, with less than half the fuel (the *Po-Yang—a smaller section boat* with a fixed cut-off—being the next fastest, but using *double* the coal), and as soon as she arrived, the man you mention, without ever having tried the other and without trying mine in the river, took it off on his own responsibility, and supposing that he could have his own way. The first thing that happened to his boat after he made the change, was that the engine knocked out her cylinder-head, by working water, which the other valve would not allow to escape, but which mine would. The next thing was to increase his coal consumption $38\frac{1}{2}$ per cent. in a fresh water river. That he made no *experiment*, either in crossing the ocean or in China, *as you state*, I propose to prove by the following extract from his letter to his owners:—"I *intended* to make a trip to Hankow and back with Dickerson's, and then make one with Winter's, but having worked Dickerson's *all the way from New York*, I came to the conclusion that we had given it a good trial;" and he took it off then and there. His owners have sent out orders to have it replaced.

Your little anecdote about me is peculiarly unfortunate for you, whether it is to be considered either in a truthful or scientific point of view. No such fact as you state ever occurred. I may be ignorant enough to make such a boat as the *Hu Quang*, which I acknowledge even at the risk of your displeasure; but I am not such a fool as to assert that a *closed valve* of any kind, would leak steam to the amount *of the boiler pressure* so as to fill the cylinder in 30 seconds or in any other time. When the valves are wide open, *boiler pressure* is never got in the cylinder. But you have stated a case and I propose to submit to you to decide who is the ignorant person, on your own showing. Your statement is that the steam in the cylinder was *two pounds* below the atmosphere—that is it was 13 lbs. of steam. You have not stated the other facts, which are, that the boiler pressure was 10 lbs., above the atmosphere, and the condenser vacuum was 27 inches of mercury, or $13\frac{1}{2}$ lbs., below the atmosphere. The pressure of steam therefore, which tended to leak through the steam valves into the cylinder, was 12 lbs., to the inch, while at the same time the pressure of steam in the cylinder, which tended to leak through the exhaust valves into condensers, was $10\frac{1}{2}$ lbs., to the inch. If the steam and exhaust valves were equally leaky, then the steam would leak *out of the cylinder* into the condenser about as fast as it would *leak into the cylinder* from the boiler—the difference of pressure between the two operations being only *one and a half pounds* in favor of the steam valve leak. Under these circumstances you state the fact to be that in 4 minutes the cylinder was filled with steam of three-quarters of a pound pressure; and that difference of leak must have also supplied the condensation, which, in *an unjacketed cylinder* standing still, is a very large amount. Is it not certain, Mr. Editor, therefore, that these valves must have been *very leaky?* If under the very feeble pressure of a pound and a half, which is no more than our atmosphere sometimes changes, the valves leaked so much, how much do you think they would have leaked, if the pressure in the cylinder had been down to *two pounds* instead of *thirteen*, and the pressure of steam had been up to *thirty* above the atmosphere, instead of *ten*, which would be the case in use? In this case the leak would have been under a pressure of 42 lbs., instead of one and a half, and its amount would be quite as much as I said it would.

As to my use of terms, I am also correct. The boilers are "*Montgomery Boilers*." The general plan on which they are made, he patented Dec. 26th 1845, and at the time filed in the Patent Office his drawings of the various shapes in which he would make them, and, among others, the *exact shape* now called Martin's boilers—although he had not at that time taken a patent for that *shape*, as he had covered by his patent all shapes in which his new mode of construction could be used. Afterwards Martin got a patent for the *shape* of a Montgomery boiler; which, if he had been the first contriver of, would have been proper—although he could not have used the boiler without Montgomery's license. When Mr. Montgomery found that he was about to be deprived of the exclusive use of one of his own shapes by this patent, he brought the question before the Patent Office, and his old drawings being produced (which had been accidentally overlooked), a patent for this shape was issued to him on the 4th day of May, 1858, over the head of Martin's; and now he stands *on record* not only the legal patentee of this vertical tubular boiler in all shapes, but also of this particular shape now improperly called Martin's boiler. Why am I not right in calling it Montgomery's?

You say that whether the condenser is an infringement has nothing to do with the question. I think it has. Mr. Pirsson has a patent for the condenser used by Government; but he does not pack the ends of the tubes with india-rubber. Mr. Sewell has a patent for packing the ends of the tubes of *any condenser* with india-rubber. Mr. Isherwood adopts Pirsson's patented *plan of condenser*, and also Sewell's *patented plan* of packing the tubes of that condenser. The Government is bound to pay both these patentees; but instead of that, Mr. Isherwood requires the contractors to pay Sewell before they can get their money, while he takes Pirsson's property without recognition or pay. Is that just? So **Isherwood** compels the builder to pay Martin for **Montgomery's** boilers. Is that anything less than a fraud?

Examine the records, sir, and if they prove the facts as I state them, speak out. The country needs all our help now, and you ought not, from any motive, to assist in concealing such transactions as these.

EDWARD N. DICKERSON.

New York, Jan. 26, 1863.

[Some time since a pamphlet was sent to this office entitled "Our Steam Navy—a Letter from E. N. Dickerson to Gideon Welles," which contained some most extraordinary statements; these were, in effect, that we had no navy at all, and that, in short, we

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were almost helpless on the sea. As these statements seemed to us exceedingly incredible, we took some steps to ascertain how far they were correct, and did consequently ascertain that beyond some ordinary engineering mishaps to four or five gunboats or sloops, out of thirty or forty of the same vessels, they performed very well. The economy with which the new vessels used coal, compared with other ships, had nothing to do with the subject as we discussed it. The whole and sole issue turns upon the worth or worthlessness of the new engines in the navy. As they are *not* worthless, but, on the contrary, are doing the country service every day, it will be seen that what we quoted in reference to some of them, applies to the ships as a class. Mr. Dickerson, however, strives to turn the point of our assertion by bringing up the old question of the utility of cut-offs; this is an altogether unnecessary diversion, and one which we cannot now consider. Mr. Dickerson does not state the case fairly, but evades the question in its main features in nearly every particular. His assertions respecting the performances of the *Lackawanna* or one of the new sloop engines are garbled, and do not do common justice to the naval engines. "*Audi alteram partem*" is a good motto, and one we strive to observe. As, for example, the *Lackawanna* was quoted by Mr. Dickerson as having been disabled alongside of the dock, and the cause was attributed to the plan of the engines, and the unmanageable slide valves upon them. The facts are, briefly, that the vacuum ring which is let into the backs of these valves was fitted too tightly, became immovable, and caused thereby (it being in contact with the inside of the steam-chest bonnet) a tremendous artificial pressure, which it was supposed *did* result in disabling the valves. It appears, however, that the valves were not cut at all. Mr. Zeller, a chief engineer in the navy, states that when he examined them after a trip down the coast, the surfaces were remarkably smooth and bright, and it seems to us that these facts ought to have been presented in company with the contrary assertions. We may also state in this connection that we do not defend or impeach the engineering character of Mr. Isherwood, or that of any other engineer, nor is it a part of our argument to assail the professional character of any one; we prefer to let events speak for themselves, as they do, generally.

Further on in our correspondent's communication we have another reference to the *Hu Quang;* and it is asserted that our conclusions in reference to the utility of a certain plan of valve are incorrect; that by the aid of these valves, Mr. Dickerson's invention, or adoption of, as he acknowledges old-fashioned plans, the vessel in question accomplished more than any other steamer ever did, and performed, in short, prodigious feats of speed and economy. This statement may be correct, but we must be permitted to say, so far as the speed goes, that it is stoutly disputed by those who dispatched the *Fire-cracker*. We would ask permission to call the attention of the engineering community to the fact that poppet valves do not permit the escape of water; if the boiler should unfortunately foam, the cylinder head, according to Mr. Dickerson's theory, must come out. What this has to do with the question at issue is not obvious. We accept as a fact the statement that Mr. Dickerson's improved cut-off has been ordered to be replaced on the engine of the *Hu Quang* again.

We cannot, however, follow this gentleman through all his intricacies and "arguments" for the reason before stated that they do not affect in any degree, as our readers will discover for themselves, the justice of our criticism. In regard, however, to the test of poppet valves as compared with single disk valves in the Morgan Iron Works, Mr. Dickerson distinctly disavows ever having made any such experiment; further down the same paragraph he admits having made some such experiment, and takes direct issue with us upon the accuracy of our information. "If," says the gentleman in question, "the exhaust valve leaked, the case would have been thus and so." The reply to all this is the fact that if the engine in question had lost steam as fast as it entered the cylinder, the condenser would soon have got hot and consequently destroyed the vacuum in the same. Unfortunately for the deductions of Mr. Dickerson, the vacuum gage indicated 3½ pounds for two hours after this experiment, consequently we stand just where we did upon our first assertion. We do not understand what point is to be gained by accusing intelligent practical engineers, of long standing in their profession, of ignorance. They are certainly ignorant of any knowledge of the art of subterfuge, and stand up to their assertions manfully.

We cannot, however, encumber our columns with this subject again. We desire to say most distinctly that we reserve to ourselves the right to criticize any public matter of importance that may come under our notice. If Mr. Dickerson takes exception to the tone of our article we cannot help it. "Those who live in glass-houses should not throw stones." Mr. Dickerson is an enthusiast on the subject of cut-offs, and goes as far in one direction as Mr. Isherwood does in another, and as the former gentleman sees fit to question our impartiality and disinterestedness on this subject, we will add that we never received a word, or a line, from Mr. Isherwood, or his friends, on this or any other subject that we are aware of.

We may also be pardoned if we cannot see how it is that Mr. Dickerson should combine all the engineering knowledge of the period; not that we are prejudiced in any way, but that it seems to us barely possible that views entertained by other members of the engineering community are so essentially different from his that they are certainly entitled to some consideration and respect. We also made some allusion to the personal motives which our correspondent had in writing the pamphlet, and so far from having changed our views, we are rather strengthened in them than otherwise. It is very difficult to see what consistency there is in condemning the whole body of our naval engineers, from first to last, as a set of ignoramuses, and then quoting, as our correspondent does, *their* opinions to sustain his own case. We have given much more time to this matter than we can spare from our other engagements, and shall not be able to refer to it again.—Eds.

The Calorific Effect of Silicious Sand in the Boiling of Water and Generation of Steam.

(Concluded from page 84.)

Quartz rock or silica is composed of 22 parts, by weight, of the metal silicon and 24 of oxygen. It is the most abundant mineral upon the globe, constituting 50 per cent. of the earth's crust, and is the principal constituent of granite. Quartz rock breaks down or crumbles into grains called silicious sand, the most abundant of all the sands. Crystallized quartz, like all crystallized minerals, preserves its crystalline form in the finest grain, each grain remaining a perfect crystal, however broken up, with focus and angles best adapted for the reflection and transmission of heat, and when in mass, however compact, preserving innumerable interstices or capillary tubes; and hence silicious sand—unlike the other earths—is always hard and sharp, and angular to the touch, and always porous to water and permeable by air, gas or steam. Silex, in its pure state, has neither taste nor smell, and, therefore, no odors can arise from its use, nor can it give unpleasant taste to drinks or viands. Silicious sand is in itself infusible by any temperature, however intense. It is not soluble, and hence never becomes plastic, as clay or mud. For heating purposes sand seems to improve by use. It is so porous, and, at the same time, so searching, that air, gas, steam and water readily rise and pass through it; and it is unequaled for purifying water from its impurities, even of organic matter in solution, and entirely excluding solid impurities or depositions into its mass, when once made clean. Depositions from water, as of lime or calcareous deposit and other impurities, will always lodge upon the surface of the sand without penetrating its substance; and what is of very great importance to steam boilers, it will not encrust, harden or adhere to the sand as to metal, but lying loosely upon the surface can be readily washed or flooded off, or removed without changing the sand.

A simple gas burner connected with a gas pipe and introduced into a body of sand, and so as just to enter it, will diffuse the gas from very trifling pressure through the entire mass of sand, so that the gas will burn upon its surface from center to circumference, and the gas is forced downward through the sand apparently with as much facility as it is upward. The vapor of alcohol or other burning fluid, not viscid, will also diffuse itself from its own elasticity through the sand, when once introduced or generated into its substance, and burn upon the entire surface until all consumed, like gas. Steam also, introduced or generated in the sand, and also water, before its final escape, will diffuse itself or spread through the entire mass. When heat is applied to the bottom of a vessel containing water and sand, the conversion of the water into steam, and its escape, will go on unceasingly until the sand becomes perfectly dry through its entire substance; the drying process commencing from the upper surface of the sand, and so readily does the sand transmit the steam that the steam will penetrate almost any depth of sand above it, wet or dry, when it will be effectually confined or prevented from rising by a small strata of cold water or not yet heated to 212° by circulation. So rapid is the heating of water and the generation of steam in sand that the water can be heard, and in glass vessels seen, to boil in it with violent ebullition, some time before the water above it becomes heated to the boiling point, or even warm. As sand first claims the heat even from the water until it reaches a certain temperature, when it begins to impart it or give it off, its first effect upon the water above it is to retard, somewhat, the warming, but in all vessels of any considerable extent of sand surface—even with the water entering down through the sand from above only, and in every case where the water is forced upward by hydrostatic pressure—the entire mass of water reaches the boiling point sooner with the sand than without it. Water introduced into the bottom of a vessel containing sand, or below the sand, so as to produce hydrostatic pressure upwards, will always rise in the vessel as high as the water source of supply, and so as to completely saturate the sand and keep it wet, and protect from the fire the metal in contact with it, no matter how quick or intense the fire of the furnace or narrow and deep the vessel containing the sand. The sand will measurably, in itself, and without water, protect the metal with which it is in contact, upon the same principle that water protects it, that is, by absorbing the heat that would otherwise accumulate in the metal; and were the contact as complete in the one case as in the other, which is impossible, sand would give more perfect protection to the metal than water, for it absorbs heat much more readily, and does not (like water) boil away or evaporate. The sand will hold, without increase of bulk, more than half its volume of water, and may itself be considered a reservoir of water. Its specific gravity or weight being more than three times that of water, it lies at the bottom of the vessel in a mass, without floating in grains through the water, however violent the ebullition, the force of steam acting upon the water and not upon the sand, but if the water and steam be confined without sufficient room for spread or expansion, the force of the steam will move both water and sand.

Sand contains no inert or latent heat that has been communicated to it as sensible heat, and its specific caloric, so-called, or susceptibility to heat, is such that, from this cause as well as from its superior absorbing powers, it is much more economically raised to a given temperature than an equal weight of metal or water. Sand, from its comparatively slow conduction of heat as compared with metal, much longer retains its radiating temperature of sensible heat, and then, again, the radiating power of the sand, or its equivalent power of imparting heat to water by contact, being in direct proportion to its absorbing and not its conducting power, it possesses unequaled power of heating the water, not only from its own inherent properties of imparting heat, but also from the greatly-increased and extended heating surface of the grains of sand, in which the water in almost infinite division in its circulation necessarily comes in contact. Water in the remote parts of the boiler where there is no sand, will circulate through the sand nearest the fire or wherever is the greatest heat, giving place again to water of less temperature, until the whole is converted into steam. So readily may heating surface to water, and its increase or diminution at pleasure, be obtained by this simple and beautiful application of sand, that we ever have it in *maximum*, or in exact adjustment and proportion to the intensity of the fire, capacity of the furnace or heat required, without regard or reference to the metallic surface or size of the boiler, provided that it

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be large enough to contain the water and sand and for steam expansion. CALVIN PEPPER.

Albany, Feb. 3, 1863.

Manufacture of Glass---Implements Wanted.

MESSRS. EDITORS:—After reading the interesting article on "Flint Glass" recently published in the SCIENTIFIC AMERICAN, I thought a few additional suggestions might be acceptable to your readers.

Glass-making is one of the few branches of industry in this country which have comparatively remained behindhand in the employment of machinery, for which as a people we are so justly celebrated. Outside of the iron molds used in casting hollow-ware very few mechanical tools are used, and there is probably no other business in which so much depends on the skill of the workmen. The French have been using for years, with great success, wooden molds for shaping all objects made of a cylindrical form, and have thereby been enabled to produce more regular and cheaper wares. I am not aware of any manufactory in the United States using the same means, although efforts have been repeatedly made to introduce it by Frenchmen acquainted with the business. It seems as if, strange to say, our glass manufacturers were behind their brother manufacturers in wishing to introduce labor-saving machinery. Any one visiting glass-works will notice how impossible it seems to be for a workman to shape two articles alike with the scanty tools at their command. It is in fact an impossibility, as can be ascertained by comparing and measuring any two of them together. It certainly is not more impossible to attain perfection in that business than in any other.

If from glass-blowing we pass to the cutting we will find the same difficulties, if not greater, for how can a man produce regular and similar patterns with a simple grindstone, as it were, having nothing to guide him but his steadiness of nerve and intelligence? The same defects exist in cut-ware as in blown-ware as regards regularity; moreover, it is a well-known fact that glass-cutters as a class suffer from diseases of the chest, occasioned by the constant strain thrown to that part of the body in holding objects to the grinding-wheel. In glass-making we cannot, like in other branches, produce articles beyond a very limited size, machinery not being used, human strength cannot go beyond a certain limit, this tends to restrain the use of glass, whereas, if large pieces could be manufactured, glass could be applied to many purposes unthought of; in fact, almost anything made in other wares could be manufactured in glass with much more beauty. Our places of amusement, our private residences could be fitted with mammoth gas fixtures, legs of pianos could be made, vases and urns of colossal dimensions, &c. We could ornament those objects with beautiful cut designs, in a word, glass-making would be on a par with other manufactures.

The inventive genius of this country however, has not altogether been as dormant as would be supposed from the above. A machine was patented some years ago, and was put on trial in your city by the inventor, a practical man in the business, then residing there. It cut several decanters and goblets with perfect regularity, unaided by the skill of the workman; the only attendance required was simply to push the machine backward and forward, it would then perform its duty with unerring precision. This, although a rough trial, proved that objects of any dimensions could be cut with perfect ease to the workman and mathematical regularity. Want of means, as in many other cases, prevented the inventor ever since from introducing the machine into our glass manufactories. The same inventor also devised a mechanical tube for blowing glass without the aid of the workman's lungs, an advantage that no doubt would be highly appreciated by many workmen.

I am not aware of any manufactures in the United States, besides the Boston Glass Works, making colored glass—an art in which the French are so renowned. We have often noticed the beautiful cut-glass bottles made of one, two and sometimes three different kinds of colored glass, the cutting showing the different coats, as it were, one above the other. It is true our Boston works produced a few good colors but we are still sadly behindhand with Europe. Our flint glass, however, has a very good reputation in Europe, thanks to the pure materials this country affords, for we have no need to go abroad for anything used in the manufacture of glass, if we are willing to open the natural resources it has spread in every direction. Why then should we not be able to reach the perfection of European manufacturers when we have everything we need? Let our manufacturers open their doors freely to improvements and encourage inventors and we will soon be able to rival Europe in every respect.

It also seems strange that, so far, we have not manufactured our own looking-glass plates. Is the French monopoly so very rich as to prevent it or have we not the requisite talents and energy to do it? Capital ought not to be wanting for such an enterprise, for it is a well-known fact that the business is immensely profitable. C. C.

Washington, D. C., Feb. 2, 1863.

More about Milling.

MESSRS. EDITORS:—I noticed in the SCIENTIFIC AMERICAN of the 17th ult. an article entitled "Questions for Millers," and having had considerable experience in that business, I will give what information I can on that subject.

The process of grinding is by passing the grain between two planes and crushing it on the feather edges of the furrows in the stone, and rubbing it over the lands or smooth planes by cracking or creasing, similar to the action of a file, for the purpose of rubbing the inside of the grain from the bran or outside. Now, if a file be dull everybody knows that you have to press harder upon it to make it cut, and just so with a millstone that has become smooth in the face. You have to use more pressure upon the grain, thus causing a large amount of unnecessary friction and loss of power, and injuring the flour by making it more subject to become sour. It also impairs its rising qualities, giving it a watery appearance when made into bread.

In regard to bolting, flour that is bolted when warm is certainly a little fairer, but the reason is that the meal is more adhesive and closes up the meshes of the cloth; but at the same time a less quantity of flour is thus made, for a portion of it goes in with the offal and yields "shorts." I cannot see why cool meal should be more liable to burst the cloth. It does not increase its weight, for if you grind twelve bushels per hour, 720 lbs. of meal go through the bolts in the same time, hot or cold. All that is necessary for cool meal is to have a finer cloth, and keep the feather edges of the stone furrows smooth, with a fine edge, and the face should not be cracked too much. If it is desired to have the meal warm it may be heated by conveying it over hot pipes, which would be a better mode than to heat by friction. SAMUEL GOODLAD.

Prairie du Sac, Wis., Feb. 3, 1863.

Proposed Modes of Canceling Postage-stamps.

The following is interesting information respecting proposed methods for cancelling postage-stamps, being a correspondence with the Post Office Department at Washington, on the subject.

MESSRS. EDITORS:—I herewith send you a copy of a correspondence, regarding the gumming of one-half the stamps, leaving the other to be torn off; which I think might prove of some value to you. Would not an electric battery answer the purpose of perforating the stamp, for a medium battery would be sufficient to cancel two or three letters at a time; though it might be too costly, and not do the work accurately. LEWIS LAESCH,

Philadelphia, Jan. 26, 1863.

POST OFFICE DEPARTMENT,
Washington, Jan. 23, 1863.

SIR:—The plan for canceling postage-stamps proposed in your letter of the 19th inst., had previously been submitted to this office by some half dozen persons in various parts of the State, and was patented some time since by Marcus P. Norton, Esq., of Troy, N. Y. The objection to this mode of cancelation is the time required to effect it, as the operation of detaching the free portion of the stamp would manifestly be much slower, than the present mode of stamping by hand, while even the latter is not sufficiently rapid to meet the requirements of the larger post-offices, and an effort has been made to obtain a stamping machine to supply this deficiency. In the case of internal revenue stamps, the above objections would not of course hold good. A. N. ZEVALY,

Third Assistant Postmaster General.

GAS is now employed for lighting carriages on the Lancashire and Yorkshire, London and North-Western, and Great Northern railways.

Wells in the Deserts.

The French are acquiring great influence among the desert tribes of Algeria, by the introduction of useful European arts, especially that of boring for water. Beneath certain sections of the Great Desert there is either a subterranean lake or river; and this has been long known to the native Arabs, among whom there are professional well-sinkers, who form a numerous body, enjoying much consideration; their work being of a very dangerous character. They excavate in the ground, and when they reach a certain depth they know by the color of the soil if water is below. A thin crust covers the subterranean stream, and when it is broken the water in it rushes up with the velocity of petroleum in American oil-wells. In the south of Algeria, the well-sinkers endeavor to find a subterranean stream, which is sometimes tapped at the depth of about 550 feet. Colonel Dumas, of the French army, thus describes the mode of excavating them:—

"The section is in a square form. One workman alone works at it; and, as he advances, he supports the sides with four planks of palm-tree. By certain infallible signs—for instance, when the soil becomes black and moist—he knows that he is near the spring. He then fills his ears and nostrils with wax, that he may not be suffocated by the uprising deluge of water, and fastens a rope under his arms, having previously arranged to be drawn up on a given signal. At the last stroke of the pick, the water often rises so rapidly, that the unhappy well-sinker is drawn up insensible. These inexhaustible springs are the common property of the village which has discovered them, and are conveyed to the gardens in conduits of hollowed palm-tree trunks. It is these springs which are the foundation of the greater number of the oases of Sahara." In 1853, when French conquests had extended to the vast and mysterious solitude called the Great Desert, well-boring and sinking apparatus were introduced, and astonished the Arabs by their simplicity and effectiveness. In the five years ending 1859-60, fifty wells have been opened; 30,000 palms and 1,000 fruit trees have been planted; many oases have revived from the ruin caused by a failure of springs; and two villages have been created in the Desert; the total expense not having been much more than £20,000 sterling, which has been repaid by taxes and voluntary contributions from the Arabs. Colonel Dumas observes: "Such works give us ten times more influence than our military victories. The waters bubbling up from these borings are generally charged with sulphate of soda, magnesia, and lime, either as a chloride or a sulphate, which makes them bitter and salt; but the Arabs are only too glad to have any kind of water, and the palms and other vegetable products of the Desert thrive on it." The borings of Sidi-Sliman and K'Sour present the curious phenomenon of live fish. A parallel to this case was reported by M. Aymé, governor of the oases of Egypt, to a scientific society in France. In clearing a well 325 feet deep, he said "he had found fish fit for cooking." The French propose to extend these wells into the Desert, so as to unite the rich oases of Touat (on the route to Timbuctoo) with Algeria, and thus direct the stream of overland commerce into its ancient channel by Algeria.

PRINTING PAPER.—The *Boston Journal* says that the consumption of paper in this country equals that of Great Britain and France together. In 1854 it was estimated that 250,000,000 pounds were made here, valued at $25,000,000. About 405,000,000 pounds of rags were used, at an average cost of four cents per pound. In New England, the Middle and Western States, the value of book, job and newspaper printing was returned by the last census (1860) as $39,428,843, of which eleven millions worth consisted of books, the value of the latter being nearly equal to the whole product of the same branch in 1850, which was returned at $11,586,549. The manufacture of paper has increased in an equal ratio, the State of Massachusetts alone producing paper of the value of $5.968,469, being over 58 per cent of the product of the Union in 1850.

A TUBE, furnished with a circular cutter made of rough diamonds, is now said to be employed in France, for the purpose of boring into hard rock.

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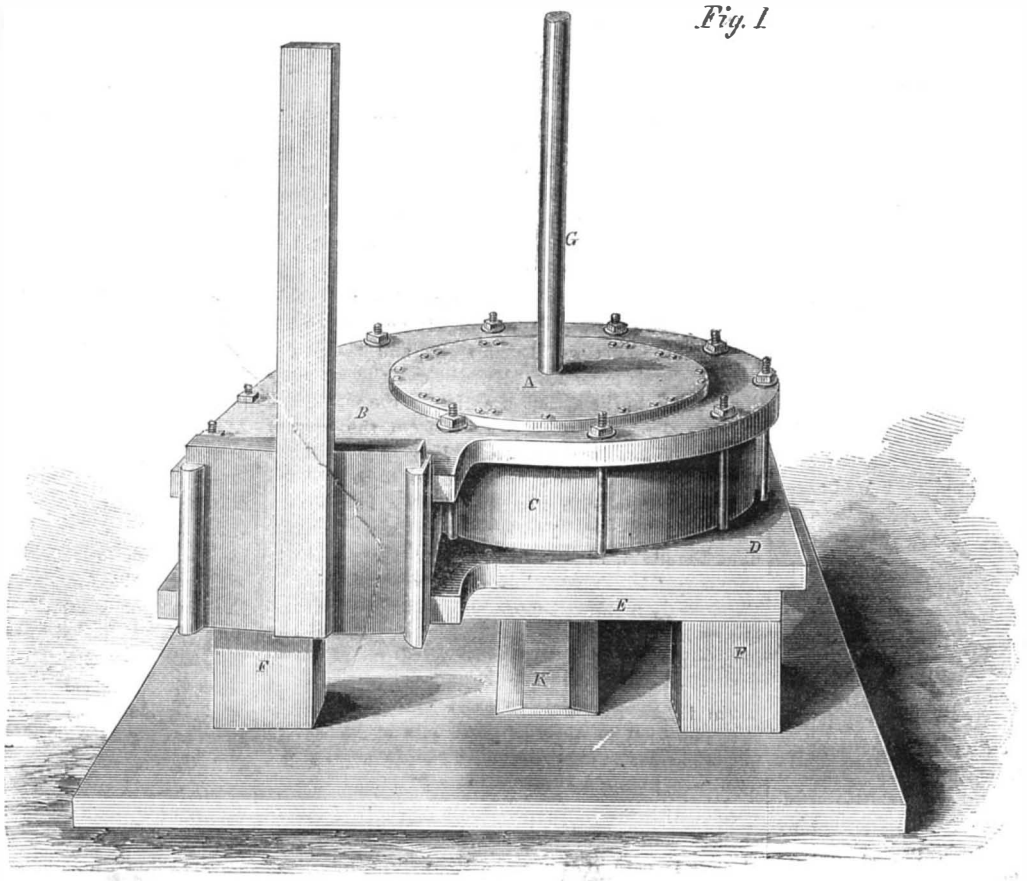
Improved Water Wheel.

The importance of a cheap and easily managed motive power cannot be exaggerated. Especially is this the case in rural districts, and in parts of the country remote from towns or villages. Here we will illustrate a simple but effectual water wheel, which is highly spoken of by those who have used it. A reference to the several views of this wheel will render our description plain. Fig. 1, represents the wheel and its case in perspective. The cover of the case, A, is made of two-inch oak plank, the top of the chute, B, is also of oak, two and a half inches thick, C, is the circumference of the chute and D the bottom of the same. The square wooden frame, E, is two inches larger than the diameter of the wheel, and is supported by four posts, F, one of them is placed under each corner of the frame. The shaft, G, of the wheel, seen in Fig. 2, rests on the hard wood step, H, this step is boiled in tallow, and is received by the casting, I. There is further, a ring, J, cast on the saddle provided with four set-screws, by which the step can be set properly. The timber, K, supports the whole fabric, step and wheel, and the buckets, L, are curved to suit the velocity of the current under which the wheel is to be run. Provision is made for replacing them when broken. The concave hub, M, is turned off on its periphery so that it fits closely to the top of the chute. The ring, *o*, is adjustable, being laid loosely on the bottom of the chute, so that it prevents the water from leaking out; this, it is stated, has never been obviated before by an iron wheel working in a

Fig. 1



BURNHAM'S PATENT CENTRAL-DISCHARGE WATER WHEEL.

Fig. 2.

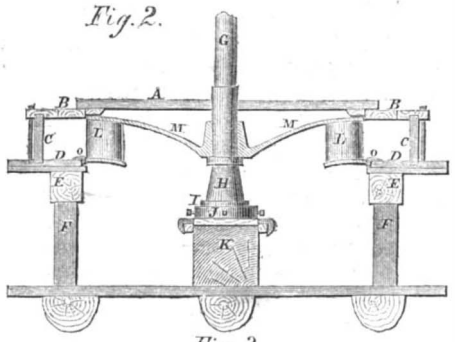
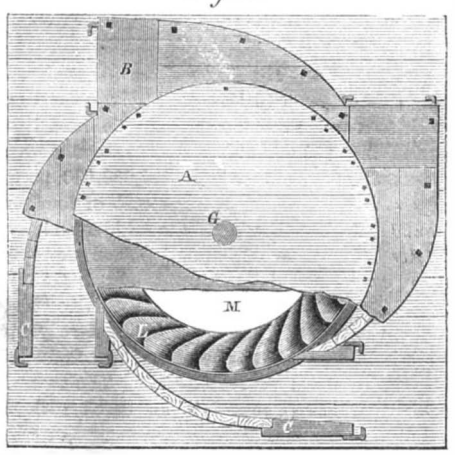


Fig. 3.



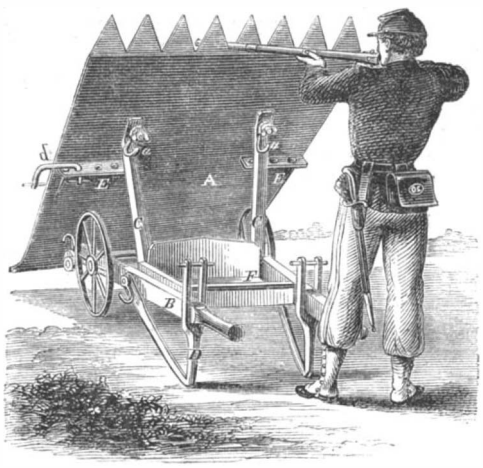
wooden curb. Fig. 3, represents the same wheel with four chutes; it can be made with either one or four, as parties may desire. This water wheel is the invention of N. F. Burnham, Variety Iron Works, York, Pa. A patent has been ordered to issue through the Scientific American Patent Agency. Further information can be had by addressing the inventor at York, Pa.

Repairing the "Great Eastern."

We notice a communication in the London *Engineer* of Jan. 16th, from a Mr. Young, C. E., in which he quotes the "Transactions of the Society of Arts for 1823," to prove that the device adopted by Renwick Bros., of this city, was identical with the one there described. This point being granted, how does that affect the question of the difficulties which were overcome and surmounted by the contractors here, the credit for which they are just as much entitled to as if the apparatus were novel or as if it were a thousand years old?

SHERMAN'S PORTABLE BREASTWORK.

The importance of protecting infantry in the field from the attacks of sharp-shooters or other soldiers detailed for special duty is acknowledged by all persons familiar with military science. This end has been the study of many inventors. We illustrate a plan designed to afford such protection, which will be readily understood by referring to our description. It consists of an iron breastwork, A, mounted upon a truck, B. The top of the iron plate has a serrated edge, which is intended not only to prevent the breastwork from being scaled by the enemy, but also to furnish a protection for the head, and loopholes for the musket of the soldier or sharp-shooter behind the barricade. There are two upright braces, C C attached to the truck, which strengthen the iron plate and render it more stable. The slotted legs, D, at the end of the truck, allow the handles of the same to be raised or lowered, as may be desired, thus varying the natural angle of the breastwork's inclination 45°, at the will of the soldier. The upright braces have thumb-screws, provided with long hooked ends, *a*, on which the sharp-shooter can place his weapon; the screws also fasten the ends of the braces to the plate. The appendages, E E, are supplied for the purpose of securing two or more sections of these defenses together; they have staples, *b*, which engage with similar fixtures upon the other plates, and prevent them from being forced apart from the outside. There is also a box, F, formed in the truck, which furnishes a convenient receptacle for hand grenades or other missiles thrown when in close action. These details comprise the main features of the portable breastwork.



Our artist has so fully depicted the uses to which this invention can be applied, that further comment is unnecessary. It may be well to add, however, that the breastwork is light, easily wheeled from place to place, and affords a shelter from inimical bullets; this will, we think, be highly appreciated by soldiers. The picket can thus defend himself from the unscrupulous foe, or infantry moving to attack other infantry can, by the aid of the portable breastwork, deliver their volleys at close range.

This breastwork is the invention of Mr. S. M. Sherman, of Plover, Wis. Further information can be had by addressing him at that place.

HOW FLINTS ARE FORMED.

The rounded nodules called "flints" are usually found in chalk beds, and are supposed to be organic remains transformed into chalcedonic quartz. Flint is nearly pure silicic acid, and at one time it was extensively used in the manufacture of pottery and glass, hence the common term "flint glass," in the production of which white sand has superseded it. It has been a subject of some wonder how flint, which is nearly pure silica, could be formed out of organic remains, such as the eggs of extinct creatures in chalk formations. This subject was lately brought before the London Chemical Society, when Dr. Church stated that the origin of flints could be traced to water holding silica in solution. During the percolation of such water through beds of chalk, the silica became separated and the carbonate of lime took its place in the water thus deprived of its silica. An interesting example of the deposition of silica in the form of chalcedony took place within a comparatively recent date, geologically speaking. About the year 1400 a basket of hen's eggs had been left in a chalk pit at Winchester, England, and this basket was lately found covered up with broken chalk. The organic matter and the shell of the eggs had entirely disappeared and their places occupied with the semi-transparent variety of silica—chalcedony. Silica was also deposited upon the willow twigs composing the basket, forming a crust of silica.

THE higher the temperature to which steel to be hardened is raised, and the colder the fluid into which it is plunged, the harder and more brittle it becomes. In India glaziers never use a diamond to cut glass; they use steel points hardened as described.

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VOL. VIII, NO. 7....[NEW SERIES.]....*Nineteenth Year*.

NEW YORK, SATURDAY, FEBRUARY 14, 1863.

ENGINES FOR SCREW STEAMERS.

There have been a great many improvements in this class of engines of late years. As screw propellers grow in popularity, more attention is given to the details of their engines until they will soon, if they do not already, rank first class as steam engines. It is very hard to overcome prejudice and popular ignorance, and we assert that the introduction of propellers has been much delayed in this country by the assumed inelegant and unmechanical appearance of their steam machinery. This is absurd. Short strokes necessitate short connections, in propellers at least, by reason of the position of the cylinders. To avoid complication they must work athwartships. If bevel gears be employed, the engines might work parallel with the keel, but this is more objectionable, for many reasons, than crowding the machinery into a small compass. Oscillating engines are employed upon our Northern lakes with very beneficial results as regards speed and economy. The custom with some engineering firms, there, is to place the cylinder as high as possible from the bedplate without injuring the stability of the hull; as a consequence, the piston rod is very long and the vibration of the cylinder reduced to a very low figure. These engines make from 75 to 80 revolutions per minute with ease, and attain to still higher velocities, for all that we know to the contrary. They are high pressure condensing engines, working steam at fifty and sixty pounds per square inch. One of these engines that we saw, not very long ago, had the air pump inside of the condenser. To get at the pump it was necessary to take up the condenser, there being no bonnet upon the top of the same, to effect an examination of the valves or renew the packing. Ericsson, in his *Monitor* batteries, has introduced a form of screw engine which appears to have some good features about it. There are two steam cylinders which are cast in one; the line of their bores is coincident, divided transversely in the center by a partition or bulkhead. That is to say, a cylinder four feet in length is divided into two cylinders nearly two feet long. From these cylinders issue trunks, in the place of piston rods, to which the pistons are keyed. At the bottom of the trunks, as usual, is jointed the rod which transmits motion from the piston to a long lever secured upon a rockshaft on the main bed-plate. This rockshaft has an additional lever to which the connecting rod is attached that drives the main shaft. Both of these cylinders work the levers and rods on one shaft. The pistons work horizontally and can be readily examined from the larboard and starboard sides of the ship. The valve gearing is very simple, nothing in fact but the ordinary eccentrics and slide valves. These engines are very plain and free from complication; there is nothing about them except what is required to impart motion or withstand strain. There are neither crossheads, side rods, or guides of any kind to the pistons, except such as are afforded by the trunks. These, we believe, are found all-sufficient. These engines afford, by properly proportioning the lengths of the arms or levers on the rock shaft, a length of crank from center to center equal to one stroke of the piston. They are compact and yet easily accessible in all their working parts. It has been urged that these engines are objectionable in one feature, that is, the springing of the levers caused by quick working. This necessitates a large clearance at one end of the cylinder, giving an unnecessary amount of steam room, and consequently incurring waste of fuel. Also that the main valves and ports are very small. It seems to us that the mechanical difficulties might be overcome by substituting heavier levers or else a different pattern of the same, whereby the trouble could be remedied, provided the evil complained of is of any magnitude. At any rate they seem capable of great simplification and are not straggled all over the ship, as is the machinery of one gunboat we know of, now building. Simplicity of design and the economical application of steam are the cardinal virtues in engines of all kinds.

THE SCIENCE OF IRON AND STEEL.

Erroneous conclusions founded upon imperfect observations frequently pass current for science. Apart from properly conducted experiments, no dependence can be placed upon mere opinions relating to questions of science. Of this we have been reminded in a striking manner by the experiments of David Kirkaldy, of Glasgow, Scotland, in testing the qualities of iron and steel in sustaining strains. He has tested several hundreds of bars, plates, bolts and angle irons, and has given to the public in a volume the results of his experiments. The subject has also been discussed upon the reading of a paper by him before the Scottish Engineers' Association. It has hitherto been assumed that the breaking strain of iron or steel indicated its quality; the results of those experiments do not confirm that assumption. A high breaking strain of steel and iron was found in qualities that were dense, fine and moderately soft, and in others that were very hard. A low breaking strain was found belonging to qualities which were hard but coarse in the texture; and in others that were very close in the texture but extremely soft. An opinion has also very generally prevailed that the breaking of shafts in steam engines and the axles of locomotives and railway cars was caused by the metal losing its fibrous character and becoming crystalline in its structure. It had been observed that broken axles and shafts of wrought iron exhibited a crystalline fracture, and we well remember how many lengthy papers were published on this subject a few years ago, all in proof of the metal changing from its fibrous to a crystalline structure by the vibrations to which it had been subjected. Mr. Kirkaldy's experiments have proved that all fibrous iron fractured suddenly invariably presents a crystalline appearance, but when fractured slowly its appearance is invariably fibrous. Take the same bar of wrought iron and snap one part suddenly and the fracture will be crystalline; then break another part of it by drawing it slowly and it will be fibrous. This puts the question of vibrations and crystallization of axles upon a new basis. Iron is less liable to snap the more it is worked and rolled. In this age of iron, when this metal is so extensively used for such a variety of purposes, such as in machinery of all kinds, ships, bridges, houses and engines on land and sea, different qualities of it are suitable for different purposes, therefore, a proper test to ascertain these separate qualities is very valuable. This has been furnished by these experiments so far as it relates to iron and steel in the moving parts of engines. This test is the breaking strain and the fractured area. For example, let us take two bars of iron, one inch square, and submit them to a severe strain until they break. If one snaps with a pressure of 45,000 pounds on the inch and at the place of fracture, the bar measures one square inch; while the other bar breaks with the same strain, but is so drawn that the fractured area measures only two-thirds of an inch square. The latter is surior to be applied for resisting strains, as it is not so liable to snap. Mr. Kirkaldy says: "The softer the iron the less liable is it to snap, and fine soft iron being more uniform in quality, it can be depended upon in practice. The load which this description of iron can suspend with safety may approach more nearly the limit of its breaking strain than can be attempted with the harder and coarser sorts." In the treatment of steel by hardening in oil and water, it is stated that when heated and plunged in water, its strength is reduced, but when cooled in oil its strength is increased. The cause of this is still inexplicable, but it is an important and valuable fact for mechanics. Iron and steel are rendered stronger by cold rolling and wire drawing. It has hitherto been supposed that this was due to the metal being condensed, but this is not the case, for the rolled iron and wire, in proportion to their thickness are not heavier than before being subjected to these operations.

In the discussion which took place on the reading of Mr. Kirkaldy's paper, W. Simons stated that the result of such experiments would tend to reform the present mode of arranging iron in building ships. Hereafter the longitudinal fiber should be placed in the direction of the most constant strain—a principle which had hitherto been ignored in marine construction. B. Conner stated that in experiments recently made at Sheffield, England, by Messrs. Naylor & Vickers, to test steel for railway axles and tyres, it was observed that the steel which could bear the least tension was superior for withstanding concussions. They have tested bars with weights falling upon them from hights varying from one to thirty-six feet, and had found that those bars which have stood the greatest tensile strain were most easily broken by concussion. Steel which stood about 35 tuns of tensile strain to the inch was the best for journals.

As it regards galvanized iron some persons have contended that the process of zinc-ing weakened the metal. Mr. Kirkaldy's experiments go to prove that galvanizing does not injure the strength of iron in large sections, and this result has also been confirmed by experiments with galvanized wire rope. Dr. Macquorn Rankin stated that ungalvanized iron was a shade stronger, but the galvanized was more extensible, and the result was that what galvanized wire rope wanted in tenacity was made up by being more extensible, and thus better able to resist a shock. Cast iron is stronger with the skin than without it, and if castings were made so perfectly as not to require turning or planing they would be much superior for most purposes. Wrought iron should always be forged as perfectly as possible, so as to avoid cutting across the fibers to make it fit. Much has yet to be learned respecting the science of iron and steel in the adaptation and application of these metals to the useful arts. The foregoing is a useful addition to the stock of general knowledge on such subjects.

GOVERNMENT PROPOSALS FOR CANNON.

Proposals have been made by Brigadier-General Ripley, Chief of Ordnance at Washington, for furnishing the Government with 13, 10 and 8-inch cannon—number not specified—also for furnishing one hundred 24-pounder flank-howitzers. They are to be fabricated of cast-iron from drawings which will be supplied by the Ordnance Department. One 10-inch trial gun is to be made of warm or cold-blast charcoal iron, to be cast hollow and cooled from the interior, and to have a tenacity of metal of not less than 30,000 pounds per square inch, to be determined by testing specimens taken from the sinking head of the gun, and from a cylinder cast from the same heat, and from metal of the same quality as that from which the gun is cast. This cylinder is to be cast on end, in dry sand molds, and is to be 72 inches high, with an elliptical base of 24 inches greater and 16 inches lesser axis. The specimens are to be cut from the gun head, and a slab 4½ inches thick from the cylinder, by planes parallel to and equi-distant from the axis of the cylinder and the lesser axis of the base. The Ordnance Department will test the specimens, furnish the ammunition, and prove the trial gun, which must be ready for trial as soon as possible, and not later than three months from the date of the contract. No contract will be given, nor will the trial gun be paid for unless it shall endure a proof of 1,000 rounds, with service charges of powder, of which 200 rounds will be with solid shot, and 800 rounds with shells.

The testing will be done free of charge to the contractor, but he is to furnish facilities for the testing. All the cannon must be made of the same quality of cast-iron as the trial gun, and each cannon is to endure the regular proof and inspection. No bids will be entertained but from founders engaged in the business. With each bid for the cannon, a penal

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bond of not less than $30,000 must be filed and signed by two responsible parties. The howitzers must each weigh when finished not less than 1,476 lbs.; the penal bonds for the contract with them are set at $10,000. The bonds will be forfeited if the cannon and howitzers are not delivered at the time agreed upon and specified in the contract. Proposals are open until the 27th of February.

SUCCESSFUL EXPERIMENTS WITH PROJECTILES.

From time to time we have published in the SCIENTIFIC AMERICAN reports of artillery practice, and of experiments with shot and shell. The progress of our inventors in this respect has been gratifying, and we can demonstrate to a degree which will be satisfactory to our foes, that we possess means of defense which it would be extremely impolitic for them to come in contact with. There is nothing like a strong arm to awe the insubordinate, and if we can show that we are strong in a military sense, that will be the best possible protection we could have against foreign intervention. Late experiments with the famous Stafford projectile and sub-caliber shell show that it is one of the most formidable weapons of its class. In Washington on Monday, Jan. 26, 1863, a shell weighing 86 lbs. was fired from a 150-pounder Dahlgren rifle, with a charge of 15 pounds of powder, at a range of about 50 yards, into a target representing a section of the *Warrior's* broadside. The shell exploded in the target, between the plating and timber braces, and blew the same to fragments. Also, a shot weighing 108 lbs. was fired at the same target, at the same range, and went completely through and buried itself five feet in the bank behind. The wood and iron of the target were driven before the shot, which made a very ragged hole, and flew in all directions. Previous experiments with these projectiles, proved conclusively that targets of 9-inch iron plates, backed by 21 inches of hard wood, can be readily penetrated when fired from the Dahlgren gun. Indeed the inventor of this shot thinks that the Dahlgren gun is one of the best in the country, a great many of his experiments have been conducted with it, and he is satisfied to endorse its virtues as a national arm. Experiments were also made at West Point with the Stafford projectile, at which the most favorable results were obtained. We have before us an official report of them, signed by Captain Benét, of the Ordnance Department, in which their good qualities are set forth. Angulated targets nine inches in thickness, it is said, can be penetrated with ease. In view of the facts above stated, it is gratifying to know that the Government has ordered the projectile and shell for the service.

The patents of Mr. Stafford were secured through the Agency of this office, and the claims of his last one may be found in the official list of claims on another page.

DEATH OF PROFESSOR ROBINSON.

An eminent American scholar has departed from among us. Professor Edward Robinson died in this city on the 27th ult., in the 69th year of his age. He was born in Southington, Conn., on the 10th of April, 1794, and after his preparatory studies he became a student of Hamilton College, N. Y., where he graduated with distinction in 1816. In this institution of learning he subsequently acted as tutor and devoted himself assiduously to his favorite study —philology. In 1821, he removed to Andover, Mass., and in that seat of theological learning, he became a favorite of Professor Stuart, whose Hebrew class he taught in the absence of the learned teacher. After five years' residence in Andover, where he had drank deep at the fount of Greek and Hebrew literature, he visited Europe to enjoy the advantages of travel and the benefits that could be secured in some of the German universities. In 1830, he returned and acted as professor at Andover for three years, then he removed to Boston where he devoted himself to literary pursuits, and from thence he came to New York in 1837, having received the appointment of Professor of Biblical Literature in the Union Theological Seminary. Previous to his entering upon the duties of his professorship, however, he made an extensive tour of the Holy Land, and examined critically the important places mentioned in the Bible. His profound knowledge of the Greek and Hebrew languages and his great powers of observation led to important results, which were given to the world in three volumes entitled "Biblical Researches in Palestine." His conclusions in many respects were different from those of several travelers who had preceded him, and whose works were held to be reputable by biblical scholars. The "Biblical Researches" were published in England and Germany as well as America, and they at once attracted the attention of European linguists, who were not slow in recognizing the merits of the American scholar. This work is generally recognized as standard authority by biblical students. The acuteness of research and correctness of description displayed in it gained for its author well-deserved celebrity. In 1852, he made a second tour of Palestine, and gave the results of his second travels in the Holy Land in a new edition of his "Biblical Researches." He was the author of several other very learned works which acquired for him a European reputation for scholarship enjoyed by no other person on this continent, we believe. He was a clear writer, a profound thinker, a keen observer and an ornament of the Christian faith.

SNOW.

The moisture formed in the atmosphere, which, in more genial seasons of the year, descends in showers which revivify the parched and thirsty earth, is congealed in winter into crystals of frost, and covers the world with a mantle white and pure. The uses of this provision of nature are familiar to every one. The earth, covered as with a blanket, nourishes the seeds of vegetation within her bosom so that they may spring forth green and fair at the proper season; and not only this, but the snow also prevents the soil from respiring, or breathing off those exhalations which are needful and necessary for the strength of its reproductive forces. In the country the snow falls quietly and softly and performs its wondrous office in silence; it lays long upon the sloping hillsides and the winter wheat quickens with the pains of life renewed; the stubble pushes up its sharp spears, as the snow melts away, and the blackened stumps, charred with the fires of autumn, gleam again with their feathery crowns. The evergreens, mantled with a robe even fairer than their natural one, bend beneath the weight of it and acknowledge its claims. While these scenes transpire in the country, those of the city are materially different, and snow is very often of doubtful utility there; it impedes very greatly the transaction of business; it blocks the wheels of the cars; it retards the omnibuses, and often breaks down roofs and awnings by its immense weight. It lodges on umbrellas and behind coat collars, it clogs in overshoes, and lies damp and heavy upon the garments of pedestrians and those who wander abroad; and, borne by its friend and ally, the wind, it penetrates to every crack and crevice of the cellars where the poor herd together like animals for warmth. Yet for all these unpleasant features there is a counterpoise. The removal of the snow from the sidewalks constitutes no unimportant part of the revenue of the poor persons who have no regular occupation. It has been ascertained, or, at any rate, asserted, that the expense incurred by property holders in the city in removing the snow from their sidewalks would amount to $6,000 for one heavy storm. If this statement be true, the money earned must compensate for other evils and enable them to be borne patiently by all. This winter has been remarkably open and warm so far, and we saw in the middle of January last a twig, cut from a lilac bush in western Massachusetts, whose buds were swelled almost to bursting with sap. It is to be hoped that the frost may not set in with renewed vigor, and destroy fruits, flowers and grain at one fell blow.

LANCASHIRE IMPROVING.—The steamer *Edinburgh* arrived at this port on the 29th ult., from Liverpool, bringing the gratifying intelligence that the distress in Lancashire is steadily disappearing. There is a decrease in the number relieved during the week to the extent of 7,360 persons. The funds in hand on Saturday, January 10th, amounted to £386,071—a sum sufficient for the exigencies of the next four months.

PURE AND IMPURE WATER.

At a late meeting of the London Chemical Society Dr. Woods read a paper on the character of the water which should be used for drinking and domestic purposes. He insisted that organic matter in water was injurious to health, and it was as much the duty of a physician to prevent as to cure disease. He stated that his attention was pointedly directed to this subject by the case of two French ships that had been despatched simultaneously with troops from Algiers to France, and under similar circumstances excepting the water with which they had been furnished. The water of one was obtained from a marshy place where the ague was prevalent; that of the other from an elevated position where the ague did not prevail. Soon after sailing, the troops on board of the vessel supplied with water from the marsh spring were seized with remittent fever, while not a case occurred on board of the other vessel. Dr. A. Smee, who was present, stated as his opinion that as a rule all animal excreta in water should be considered poisonous to animals of the same class, and all organic matter of a decomposable character in water was highly prejudicial to health. He believed that the best water to send to sea was that derived from deep springs in the chalk formations.

Operations of the Southern Patent Office.

One of the Richmond papers gives an abstract of the report of the Commissioner of Patents of the "Confederate States" for the past year:—

The report of the Commissioner of Patents, sent into Congress, explains the operations of this office during the past year.

The number of applicants during the year was one hundred and forty-seven; the number of caveats issued during the year was sixty-four; the number of patents issued during the year was seventy-five; the number of United States patents and assignments of United States patents in whole or in part, recorded and revived, one hundred and seventy-eight.

Amount of money received, $9,186 98; amount of money on hand January 1, 1862, $2,812 62; total, $11,999 60. Amount of expenditure, $9,391 83; balance in Treasury, $2,607 77.

The patents issued were distributed among the several States of the Confederacy as follows:—

To citizens of Virginia, 20; Mississippi, 10; Alabama, 8; Georgia, 7; Louisiana, 6; Texas, 6; South Carolina, 5; North Carolina, 5; Tennessee, 5; Arkansas, 1; Florida, 1; Kentucky, 1.

The financial condition of the Southern Patent Office is superior to our own, the Commissioner having a small balance on hand. The amount of business transacted by the Richmond Patent Office is quite insignificant, but the financial exhibit shows a respectable surplus on hand. In this respect is it superior to the Washington Office, if we may believe the assertions put forth in a pamphlet now before us, which states that Commissioner Holloway asks for an appropriation of $87,520 04, to make up a deficiency for the fiscal year ending June 1864.

TYPO-TELEGRAPHY.—Viscount de Vougy, Director General of the Electric Telegraph throughout France, has invited several members of the National Institute and some of the chief clerks of the Telegraph Department to assist at experiments about to be made with the typo-telegraph invented by the Chevalier Bonelli. The typo-telegraph of this scientific engineer can print five hundred despatches of twenty-five words within an hour! According to the system of Morse, now in use, it would require not less than twenty wires and fifty clerks to accomplish a similar work. Should the experiments prove satisfactory, it is said that the Government will concede to the Chevalier Bonelli the working of the line from Paris to Lyons ahd Marseilles.

[The above notice is copied from the London *Herald*. The invention of Chevalier Bonelli, to which refererence is made in the above extract, was secured by patent, here, through the Scientific American Patent Agency on the 6th of January, 1864.—EDS.

IRON MASTS.—The following are the dimensions and weight of the masts of the new British frigate *Prince Consort*. The mainmast is 116 feet long by 37 inches in circumference, and weighs 18 tuns 14 cwt.; the foremast is 110 feet long by 36 inches in circumference, and weighs 17 tuns 10 cwt.; the mizzenmast is 83 feet long by 24 inches in circumference, and weighs 5 tuns 14 cwt.; the bowsprit is 43 feet long by 36 inches in circumference, and weighs 4 tuns 10 cwt.

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DISCOVERIES AND INVENTIONS ABROAD.

New Cement.—Auguste A. Lerenard, of Paris, has taken out a patent for a cement to close the joints of steam, water and gas pipes. It is composed and made as follows :—India-rubber is first ground between powerful rollers, heated by steam, then melted by the use of any suitable solvent, and mixed, in various proportions, with pounded earthy oxide, chalk, Portland or other hydraulic cement, and then with plastic clay. To this mixture is added some flowers of sulphur, to vulcanize the india-rubber ; also a small quantity of any metallic oxide, such as red or white lead.

Protecting Timber Posts from Decay.—Wooden posts set in the ground soon become rotten at their lower parts. To prevent this rapid decay H. P. Burt, of London, places a receptacle near the foot of the post for receiving creosote, which latter is gradually absorbed by the post and preserved. The creosote is renewed at intervals by pouring a small quantity into the receptacle of the posts.

Protecting Iron from Rust.—I. V. De Veye, of Paris, proposes to protect wrought-iron from oxidization by coating it with a new carbon paint. This consists of the graphine carbon that is found adhereing to the interior of gas retorts. It is simply reduced to powder and mixed with linseed oil. It is also claimed to be a durable lead-colored paint for wood-work.

Tinned Lead Pipes.—A new method of tinning the interior of lead water-pipes has been patented by J. H. Johnson, of London. In making lead pipe, molten lead is forced over a core by hydraulic pressure, and discharged through an annular space. The new method of tinning consists in having a reservoir of molten tin in the lead-pipe machine, and admitting the tin through an opening in the core to the interior of the pipe as it is being formed, thus combining the drawing and tinning operations in manufacturing the pipe.

Coating and Hardening Metals.—A patent has been obtained by J. Webster, of Birmingham, England, for coating iron and steel with a copper alloy, which hardens the surface. If the article to be coated is a thin piece of wrought-iron or steel, it is heated to a red heat in a clear fire, and coated with the alloy made as follows :—One part, by weight, of antimony is first melted in a suitable vessel, then three parts of pure tin are added and melted. In another crucible ten parts of copper are melted, and the alloy of tin and antimony is added to this gradually, and the whole stirred until the mixture is complete. The surface of this molten alloy is now covered to a depth of two inches with a flux consisting of two parts of yellow prussiate of potash and two of the carbonate of potash. The heated article of wrought-iron or steel is now dipped through the flux into the molten alloy, and soon becomes completely coated and indurated on the surface. Articles of cast-iron may also be coated with this alloy in the same manner. This appears to be a very useful improvement for many purposes.

Whitworth Shells.—The new shells of J. Whitworth, of Manchester, England, which penetrated the iron target at Shoeburyness, have been patented and are described as follows :—The shells are made solid in front of the cavity, to give them sufficient strength for penetration. No fuse is employed ; the heat generated in the front part of the shell by the impact of the metal is sufficient to ignite the charge inside. The material of which the shell is made is "homogeneous metal"—a low carbonized steel. It is formed into bars, then cut into lengths, each of which is sufficient to form two shells ; these are then carbonized to the depth of half an inch, to render them hard on the surface. They are then divided and bored internally and turned externally to form two shells, and afterwards case-hardened as follow :—Each shell is placed in an iron box and surrounded with animal charcoal, cuttings of horns and hoofs, the box covered, placed in a fire and raised to a red heat. The shell is now withdrawn from the box, set up upon its end, and cooled by allowing several jets of cold salt brine to play upon its outer and inner surfaces, whereby it is made very hard. After this, it is tempered by heating it to a red heat in a bath of molten tin until it has acquired a straw color at the front, and a blue color at the rear end, then it is cooled and is ready to be charged.

Glazing Starch.—A patent has been taken out by W. Maltby, England, for manufacturing starch which produces a superior glaze on cloth. The starch is made from coarse rice, which is first ground, then placed in vats having a false bottom, where it is submitted to several dilute solutions of alkali until the washings pass off clear. The starch in the vat is then treated with a dilute solution of alum, which neutralizes the free alkali in it, then it is washed, dried and ground into fine powder. One pound of ground malt is now mixed with water, to obtain a solution of the diastaste in the malt, and the clear liquid is mixed with thirty pounds of starch made up into a pasty mass, dried in an oven, then ground into fine powder for use. A small portion of the starch is thus converted into dextrine, thus imparting a superior quality to it for producing a glazed surface on linen and cotton cloth.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list.

Tube for Carding Engines.—The tubes commonly employed for finishing and condensing into ropings the slivers received from the doffer of a wool-carding machine, have their central passage straight, and are furnished at one end of the said passage with a bail through which the revolution of the tube is made to produce the most of the roping. This bail is liable to some objections, namely, owing to the high velocity at which the tubes rotate it produces a strong current of air, and it also produces a short bend of the roping, and prevents it from leaving the tube at the center of motion, and by these means there is produced a lateral vibration a tremulous motion of the roping, which tends to produce such a separation and curling of the fibers that the roping will not draw uniformly. This motion also tends to throw the adjacent ropings against each other and cause their breakage. Again, when a roping breaks it cannot be introduced through the tube and bail without stopping the machinery. The object of this improvement is to dispense with the bail and accomplish all that is desired of it by means which are not liable to the same objections, and to this end it consists in making the passage through the tube with a longitudinal curvature. The invention also consists in lining the tube with a curved piece of glass tubing, which affords a convenient mode of obtaining the longitudinally-curved passage, and wears better and smoother than a passage formed in the metal of which the external portion of the tube is composed. Silas Wilson, of Auburn, N. Y., is the inventor of this improvement.

Lamp Burner.—This burner is so arranged that the wick can be trimmed or lighted without disturbing the shade or chimney, an arrangement very desirable for chandelier, hall or bracket lamps, and indeed all lamps upon which a chimney is necessary. Externally this burner differs but slightly in size and shape from those in general use, and will fit any ordinary lampr In the side of the burner is an opening which is covered by a door, and from the internal side of said door is a projection that is hinged to the front side of the wick tube, so that as the door is drawn from the side of the burner, the wick tube is, by a simple slot arrangement, lowered and canted or inclined in such a manner as to cause its upper end to protrude through the opening in the side of the burner. When in this position the wick may be run out by turning the ratchet wheels any distance desired, thus rendering it accessible for trimming or lighting. Then, as the door is pushed to its place the wick tube is made to assume its proper upright position, and the ordinary hight within the burner. The inventor is Homer Wright, of Pittsburgh, Pa.

Sugar Boiler.—The object of this invention is to protect sugar molds against the injurious influence of rust. The bodies of such molds are generally made of sheet iron, having their top edges strengthened by a hoop attached by rivets and their bottom edges secured to a cast-iron tip. When used in the manufacture of sugar these molds are exposed to a considerable quantity of moisture, which is liable to get between the hoops and bodies of the molds at the top edge and between the lower edges of said bodies and the tips, causing the rivets to rust and rendering the molds liable to become disjointed in a short time. This invention consists in the application of tin or soft solder to the top and bottom edges of the body of a surface mold and to the hoop and upper part of a cast-iron tip and also to the rivets previous to connecting said parts and in dipping the joints into molten tin or soft solder after the several parts have been united in such a manner that said joints are filled up with tin or soft solder, and the hoop and the top and bottom edges of the body of the mold are perfectly protected against the injurious influence of moisture, and the several parts are connected so firmly together that the mold is not liable to become disjointed. Andreas Meyer, of New York city, is the inventor of this improvement.

Improvement in Fortifications.—This invention consists in the application of masses of cast iron in the form of walls or buttresses, to receive the impact of shot, the penetration and impact of the projectile being neutrallzed by the hardness of the iron and the weight of the mass opposed to it. Our present stone forts possess sufficient weight or inertia but their outer surfaces lack consistence or impenetrability, which may be furnished them by this method when it is desired to reinforce them. J. W. Reid, of New York city, is the inventor of this improvement.

Sand in Boilers.

The communication of Mr. Pepper, on another page, is novel in its character. In principle it amounts to this, that, by the use of a stratum of pure sand in boilers and other such such vessels, a saving of fuel will be effected. Cases have been cited in proof of this position, but we think these are not quite conclusive. An increased heating surface of the metal, in boilers, &c., we think, would yield equally favorable results. In the use of hard water containing some silica and lime in solution, we think the sand would soon be converted into an incrustation upon the metal. Of course, every improvement which has for its object the saving of fuel in boilers, we regard with much satisfaction, but we suggest further experiments with sand, for the reasons given.

Purchases of Machinery.

We are receiving letters daily from parties residing in the country, desiring to purchase machinery of various kinds. It is frequently difficult for us to refer our correspondents to the proper manufacturers. An agency for the purchase of machinery has long been established at No. 12 Platt street, by our old friend and patron, S. C. Hills. He is a reliable man, and correspondents who may wish to purchase machinery of any kind cannot do better than to employ Mr. Hills's agency.

Magazines and other Publications Received.

THE ILLUSTRATED HAND-BOOK OF BILLIARDS. By Pheelan & Berger. Sinclair Tousey, 121 Nassau street, this city.

The lover of this fascinating game will find an amount of interesting and valuable information, accompanied by diagrams, which will be of great service to him in his efforts to attain to proficiency in the art. The game of billiards may be said, not incorrectly, to be in some sense a fine art, as it involves a knowledge of angles and philosophical laws; and although any man may, by pure manual and mechanical dexterity, becomes an expert in handling the cue, yet he who understands why and wherefore certain results are obtained, will learn more easily and quickly than he who guesses at all things. The editors of this work are men who have a professional knowledge of the subject, and who have attained to great celebrity in the game.

THE ATLANTIC MONTHLY. Published by Ticknor & Fields, Boston.

The February number has been received, and we note an unusual variety of excellent matter. The tale, "Little Jacques' Ghost," will be read with much interest, and appreciated as affording an insight into French domestic life, which, if not very alluring in some respects is undoubtedly correct in its delineations. There are also other stories of great merit; among them all, however, we must signalize "Under the Pear Tree," as affording the best possible foil to the dark plots and counter-plots of the story first-mentioned. The freshness and purity of the New England character is exceedingly attractive, and one turns to it with avidity after having been filled with the gloom of domestic treachery and infidelity abroad.

Back Numbers and Volumes of the Scientific American

VOLUMES I., II., III., IV., V. AND VII. (NEW SERIES) complete (bound or unbound) may be had at this office and from periodical dealers. Price, bound, $2 25 per volume, by mail, $3—which include postage. Price, in sheets, $1 50. Every mechanic, inventor or artizan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding. Nearly all the numbers of VOL. VI. are out of print and cannot be supplied.

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ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING JANUARY 27, 1863.

Reported Officially for the Scientific American.

***** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 2, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.**

37,481.—Cartridge.—Charles R. Alsop, Middletown, Conn.:

I claim as a new article of manufacture, a powder and shot cartridge, constructed in the manner and for the purpose set forth.

37,482.—Separating Fatty Matter from Animal Substances.—H. A. Amelung, Chicago, Ill.:

I claim the separating of fatty matter from animal substances by subjecting the same to a gentle heat during the crushing, grinding, or comminuting of the same, in the manner substantially as herein set forth.

[The object of this invention is to obtain a machine by which animal substances containing fatty matter may be crushed and pulverized, and the fatty matter separated from the other substances, in much less time and with less labor and loss of material than by the old process.]

37,483.—Tea Kettle.—Amos C. Barstow, Providence, R. I.:

I claim the formation of depressions in the rim of cast-iron tea kettles in combination with a flanged cover having corresponding pendent hooks, the whole being constructed and arranged substantially as described to operate in the manner and for the purposes set forth.

37,484.—Metallic Burial Case.—Amos C. Barstow, Providence, R. I.:

I claim the method herein described of constructing metallic burial cases, by dividing the upper shell or covering lid from the lower shell according to a line situated in two planes forming an angle at that part of the case which presents the greatest width transversely.

37,485.—Cartridge Box.—Augustus A. Bennett, Cincinnati, Ohio:

I claim the cartridge box, A B, whose cover, C D, is made self-closing by means of one or more metallic springs, H H′, constructed, adapted and operating in the manner described.

37,486.—Sound for the Uterus.—Benjamin S. Benson, Baltimore, Md.:

I claim, first, The combination in one instrument of a uterine sound and porte caustic as described; and

Second, The combination and arrangement of the tube, A, piston, E, index, F, and graduated slit, G, in the manner and for the purpose specified.

37,487.—Boot and Shoe Blacking Apparatus.—Isaac Bickhart, Harlan, Ind.:

I claim the revolving brush wheels, E E, one or more constructed substantially as shown; in combination with the yielding foot-stands, D D, arranged substantially as and for the purpose herein set forth.

[This invention consists in the employment or use of one or more revolving adjustable brush wheels, in connection with one or more yielding foot-stands, arranged in such a manner that boots and shoes may be expeditiously cleaned and blackened while on the feet of the wearer.]

37,488.—Clover Thrasher and Huller.—John C. Birdsill, West Henrietta, N. Y.:

I claim a rotating threshing and hulling cylinder with a threshing concave or arch above and a hulling concave or arch below substantially as described, so as to thresh the seed from the straw and stalks and hull it at one operation with one and the same cylinder.

I claim providing a toothed threshing cylinder with a rough or hulling surface between the teeth.

In combination with a toothed threshing cylinder having a roughened or hulling surface between the teeth: I claim a ribbed concave or arch, with a roughened or hulling surface on the face of the ribs, with grooves between the ribs for the threshing teeth of the cylinder to travel in or through substantially as described.

In combination with a picking cylinder, I claim the ribs on a perforated, concave screen, to hold up the straw and stalks, and allow the bolls and seed to fall through the screen, and prevent the straw and stalks from dragging or carrying the bolls and seed across the holes in the screen.

I claim arranging the crank shaft to operate the bolt, at the rear end of the machine when said crank shaft is also used to carry the conveying apron or belt, K′, substantially as described.

37,489.—Buckle for Waist Belts.—William U. Bohn, San Francisco, Cal.:

I claim the entire machinery of the buckle (with the exception of the rim) as set forth in the foregoing specification, together with the application and use of said machinery, to the purposes set forth in the petition and specification.

37,490.—Letter Envelope.—Howard C. Bristol, Chicago, Ill.:

I claim, first, A letter envelope having sealing laps, b b′, substantially as and for the purpose set forth.

Second, I claim providing the body portion of an envelope with an opening or perforation as a d, so that when the letter stamp is placed over the same, a portion of said stamp will adhere to the inner sealing lap substantially as and for the purpose described.

37,491.—Shot Cartridge.—Lewis B. Bruen, Brooklyn, N. Y.:

I claim, first, The method herein described of forming bird and buck-shot cartridges by dipping cases filled with shot in collodion, in the manner and for the purposes herein set forth.

Second, In combination with the above I claim the use of wads made in the manner and for the purpose set forth.

37,492.—Water Elevator.—Clark O. Bush, Michigan Bluff, Cal.:

I claim, first, The endless chain of buckets, B, and inclined troughs or conduits, f, in combination with the endless chain of buckets, A, when the latter is operated by the water lifted by the former as specified.

Second, The curb, H, splash boards, c c, and inclined trough or conduit, f, in combination with the endless chain of buckets, A, when arranged to operate in the manner and for the purpose specified.

[The subject of this invention is a machine for raising or elevating water from mines. It consists in an arrangement of two endless chains of buckets, which chains are of unequal length and connected together by a line of shafting, in combination with a conductor or conduit, whereby the water elevated by the short chain of buckets is conducted into the buckets of the long chain, and by its gravity made to operate the machine, and thereby to elevate water from the mine so long as any is within reach of the buckets of the lifting or short chain.]

37,493.—Railroad Switch Lantern.—C. Byrne, Kingsville, Ohio:

I claim, first, Constructing the body of the lamp practically air-tight with the double walls, F F′, and openings, G, and P and P′, for the purpose specified.

Second, I claim supporting the oil cup and wick, upon delicate springs, and surrounding the same with elastic packing as and for the purpose set forth.

Third, I claim the double grooves for the sliding panel for the purpose described.

37,494.—Composition for Water Pipes, &c.—Jonathan S. Chatham, Seneca Falls, N. Y.:

I claim the composition above described, consisting of the residuum of the burned coal tar, and sharp sand prepared and compounded substantially as and for the purposes specified.

37,495.—Device for Adjusting Wicks in Lamp Tubes.—Henry N. Degraw, Newburgh, N. Y.:

I claim the implement or device constructed as herein shown and described, to wit, of a wire or rod bent so as to form two arms, a a, and a spring, b, with a slide, c, placed on the arms, for the purpose set forth.

[This invention consists in the employment or use of a wire or rod bent in such a form that two yielding or adjustable arms will be obtained, each one of which is notched or forked at its end. These arms are provided with a slide, by moving which the notched ends may be placed at a greater or less distance apart, to suit the width of the wick. The implement thus constructed is used to shove the wick into or through the wick tube.]

37,496.—Machine for Edging Lumber.—L. A. Ensworth and B. Barker, Williamsport, Pa.:

I claim the arrangement of the two saws, E F, upon independent arbors, C G, placed upon the same plane, opposite to each other, with an open space between them; the saw, F, being made laterally adjustable, all as herein shown and described.

The combination of the two independent saws and arbors with the adjustable frame, H, rack, b, pinion, I, frame, N, and rollers, L L M M, all in the manner herein shown and described.

[This invention consists in the employment or use of a stationary circular saw, and a movable or adjustable circular saw arranged with feed rollers and placed in a suitable framing, whereby lumber may be trimmed or cut at its edges so as to be of equal thickness throughout, and the work performed with the greatest facility, but little manipulation being required in the operation of the machine.]

37,497.—Founding.—A. H. Emery, New York City:

I claim the process of retarding the cooling of any part or portion of a casting during the process of founding by means of a casing or envelope of melted metal covering or surrounding such parts and portion of the casting as may in any case be desired, and separated therefrom by a thin mold, substantially as and for the purposes herein described and set forth.

I also claim the arrangement of the sleeve, k, as its equivalent with the core barrel, D, for the purpose of retarding the cooling of the sinking-head and chase of gun-castings, arranged substantially as and for the purposes herein described and set forth.

37,498.—Dirt-scraper.—Samuel H. Dudley, Milton, Conn.:

I claim the arrangement and combination of the bar, B, and the rods P and P, with the bows, H and H, or their equivalents, for the purpose, and in manner as above set forth.

37,499.—Device for Holding Clothing in Trunks.—Levi Heischman, Rochester, N. Y.:

I claim the combination of the adjustable bar or bars, B, guides, C C, and pins, d d, with a trunk or valise, when they are used in the inside of the same, for the purpose of packing clothes and holding them during transportation, the whole arranged and operating substantially as herein set forth.

In combination with the bar, B, I also claim the spread, D, constructed and arranged substantially as specified.

37,500.—Gas Regulator and Purifier.—Peter Fontain, New York City:

I claim the opening or outlet, D (provided with a suitable stopper), in combination with the chamber, C, and its contents substantially as and for the purpose set forth.

37,501.—Breech-loading Fire-arm.—Leonard Geiger, Hudson, N. Y.:

I claim combining the swinging breech, C, and the hammer, E, by means of suitable shoulders, d e, on each, in such a manner that the hammer is made to form a brace to brace and lock the breech against the back pressure consequent upon the explosion of the charge substantially as herein specified.

37,502.—Sewing Machine.—W. O. Grover, Boston, Mass.:

I claim a long bent vibrating arm, one of whose ends drives a needle in combination with a horizontal shaft arranged under the feed and actuating the feed when that same shaft is also connected directly to one end of such bent arm extending under the spot where the needle perforates the cloth or nearly so, the whole arranged, connected and acting substantially in the manner and for the purposes herein before set forth.

37,503.—Steering Apparatus.—Stuart Gwynn, New York City:

I claim the mechanism herein described for imparting to the rudder head the requisite motion according to the resistance to be overcome, so that while the action on the prime mover is uniform, the rudder head will rotate with more or less speed as the resistance increases or decreases substantially as set forth.

I also claim the combination with the rudder head of a pintle, extending upwards in line with the axis of the rudder head and supporting said pintle by a suitable overhead frame, substantially as herein shown and described.

I also claim applying the tiller to the rudder head between two points of support thereof, said tiller being operated from a screw-shaft having annular rubber springs arranged upon it substantially in the manner and for the purpose set forth.

37,504.—Machine for Making Roving.—Noah E. Hale, Nashua, N. H.:

I claim the stationary and gravitating jaws, c d, or their mechanical equivalents in combination with the trumpet guide, A, or A′, and a stop motion or mechanism connected therewith and operating substantially in manner and for the purpose as specified.

I also claim the combination of the crank, S, the connecting rod, R (or mechanical equivalents therefor), tri-armed lever, K, latch-lifter, L, and disk, I, with tappets, f g, the same being applied to the armed rocker shaft, H, one of the draft rollers and the latch of the belt-shifter in manner and so as to operate substantially as specified.

37,505.—Hemming, Tucking and Folding Guide for Sewing Machines.—Frank Henry, Bridgeport, Conn.:

I claim the combination with the hem-turner, a b c, and foot-piece, A, of the adjustable guide, d, constructed with shank, f, bar, h, and plate, i, all substantially in the manner herein shown and described.

37,506.—Mica Chimney for Lamps.—Benjamin J. C. Howe, Syracuse, N. Y.:

I claim the oval base Fig. 6, the construction of the frame as described, and the transferable sheets of mica, a a.

37,507.—Tobacco Press.—William W. Huse, Brooklyn, N. Y.:

I claim the combination of the wheel of troughs or cells, the radial sliding partitions forming the ends of the cells, the cams for operating the sliding partitions, and the pressure wheel for rolling and pressing the plugs of tobacco in the cells, substantially as described.

37,508.—Machine for Pressing and Cutting Tobacco.—William W. Huse, Brooklyn, N. Y.:

I claim the wheel trough, that is, the wheel with flanches each side of its periphery into which the slivers of tobacco are to be placed and compressed, in combination with the two endless belts, or equivalent rollers, for introducing the slivers of tobacco to the trough-like periphery of the wheel, and the pressure roller for compressing the tobacco after it has been introduced into the trough-like periphery of the wheel, substantially as and for the purpose specified.

I also claim the endless feeding chain, substantially as described, in combination with the trough wheel, the two belts, or equivalent rollers, for transforming the slivers from the feeding chain to the wheel trough, and with the pressure roller for compressing the tobacco into the wheel trough, substantially as and for the purpose specified.

And I also claim in combination with the wheel trough and pressure rollers, a cutting mechanism, substantially as described, for cutting the compressed sliver of tobacco into plugs of the required length, as set forth,

37,509.—Machine for Drying Tobacco.—William W. Huse, Brooklyn, N. Y.:

I claim the combination of a series of clamps with the rotating spindle, substantially as described, for securing the stems of tobacco leaves to the spindle, that they may be dried by centrifugal action, as set forth.

And I also claim the series of shelves on which to place the tobacco, substantially as described, in combination with the series of clamps and the spindle, substantially as described.

37,510.—Apple Mills, &c.—Samuel Keeler, Lancaster, Pa.:

I claim the combination and construction of the double or compound-toothing of the crushing cylinders, C D, made in the manner and for the purpose specified.

37,511.—Device for Operating Churns.—Alfred, John and Charles Lamb, Jeffersonville, N. Y.:

I claim the combination of the sliding nut, E, and arm, F, with the bar, G, lever, I, screw, D′, and dasher, C, in the manner herein shown and described.

[This invention relates to an improvement in that class of churns which are provided with the up-and-down or reciprocating dashers, and consists in a novel means employed for operating the dasher, that is to say, for giving it a combined rising and falling and a rotary-reciprocating motion, whereby it is believed that the dasher is rendered more efficient in its action than the old up-and-down or reciprocating dasher, and capable of being operated with a less expenditure of power.]

37,512.—Back-sight for Fire-arms.—John B. Larock, Boston, Mass.:

I claim the arrangement of a single, elevating screw, C, within the frame, A, and its support or holding screw, a, and so as to enable the slider or carrier, B, and its eye-piece, D, to be either elevated or depressed by the revolution of one screw, as described.

37,513.—Shuttle-driver for Power Looms.—Alvin S. Lyon, Lawrence, Mass.:

I claim, in combination with the flanged rocker, the diagonal slot, R, and the fulcrum pin, S, or their equivalent, for the purpose specified, substantially as described.

37,514.—Sugar Mold.—Andreas Mayer, New York City:

The application of tin or soft solder to the top and bottom edges of the body of a sugar mold, and to the hoop and upper part of the cast-iron tip, and also to the rivets previous to connecting said parts, and in dipping their joints into molten tin or soft solder, after the several parts have been united, substantially as and for the purpose specified.

37,515.—Lock.—J. C. Mix, Terryville, Conn.:

I claim, first, The dog, E, and spring, F, arranged respectively in relation with the tumbler catches, C, and shackle, B, to operate as and for the purpose set forth.

Second, The ward plate, G, in combination with the tumbler catches, C, for the purpose specified.

[The object of this invention is to obtain a padlock or other lock of a similar class in which a shackle or harp is employed, as a trunk lock, for instance, which will be simple in construction, capable of being manufactured at a small cost, not liable to become deranged by casual blows or concussions, as when accidentally dropped, and one which will be difficult to pick or open by illegitimate means.]

37,516.—Apple-paring Machine.—J. F. and E. P. Monroe, Fitchburg, Mass.:

We claim the combination of the turn-table, N, with the cam-wheel, F, arranged and operating as described for the purpose specified.

37,517.—Steam Steering Apparatus.—C. S. Morrison, Keokuk, Iowa:

I claim the use of a reserve paddle-wheel acting perpendicularly to the longitudinal axis of a vessel, and having its shaft above the waterline, in combination with ordinary rudders or steerers; ordinary propellers and auxiliary engines acting directly upon the longitudinal shaft, the whole being arranged substantially in the manner and for the purpose set forth.

37,518.—Ambulance.—Moritz Pinner, New York City:

I claim, first, The combination of a cooking-stove with the body of a wagon, arranged and operating for use as an ambulance and kitchen, substantially as set forth and described.

Second, The combination of a cooking-stove with water tanks and a wagon, arranged for use as an ambulance or locomotive kitchen, either separately or combined, substantially as set forth and described.

Third, An ambulance wagon combining the following features, to wit: An ambulance, a medicine chest, a wagon, compartments for storing provisions, a cooking-stove and a baking-oven, the whole arranged and operating substantially as set forth and described.

37,519.—Fortification.—J. W. Reid, New York City:

I claim locking together solid blocks of metal to form fortification walls, by means of corresponding projections and cavities on the opposite sides of the blocks, when the said projections and cavities are formed and arranged in the manner herein shown and described, to avoid injurious weakening of the blocks and prevent their displacement horizontally in any direction.

I claim the application of heavy masses of cast-iron in lieu of stones to form the battery fronts of forts, and to the re-inforcing of existing forts, in the manner substantially as set forth. I do not claim the application of cast-iron in the form of plates or sheets, but only in the form of masses or blocks, and where the purpose is to destroy the effect of the shot by the superior weight of the opposing masses composing the wall or casing.

37,520.—Explosive Shell for Ordnance.—Horace Resley, Cumberland, Md.:

I claim the arrangement of the means or devices set forth for protecting the operating mechanism, and providing for the discharge when desired.

37,521.—Clothes-wringer.—N. A. Rhoads, Waterbury, Vt.

I claim the combination of the sliding jaw, D, and its clamp screw, B, with the screw, C, (or the equivalent thereof) as applied to the said part, D, substantially as and for the purpose specified.

I also claim the combination of the sliding jaw, D, and its clamp screw, B, with the screw, E, (or the equivalent thereof) as applied to the said part, D, substantially as and for the purpose specified.

I also claim the combination of the rib, d, and groove, a, or the mechanical equivalent thereof, with the sliding jaw, D, its clamp screw, B, and the screw, C, as applied to the part, D, substantially as and for the purpose specified.

I also claim the combination of the rib, d, and groove, a, or the mechanical equivalent thereof, with the sliding jaw, D, its clamp screw, B, and the screw, E, as applied to the part, D, substantially as and for the purpose specified.

I also claim the adjustable bearing or swivel pad, in combination with the sliding jaw and screw, substantially as shown and for the purpose described.

37,522.—Elastic Bulb Enema Syringe.—F. R. Richardson, Boston, Mass.:

I claim my new improvement in a syringe connection, the same consisting not only in having a bearing neck, e, extending below the annular projection or shoulder, b, (or its equivalent), made upon the pipe, A, but in having the bulb neck, D, embrace the neck, e, and the annular projection or shoulder, b, and be compressed on the latter by the screw-cap, C, substantially as specified.

37,523.—Vulcanizing Machine.—E. A. L. Roberts, New York City:

I claim the construction and arrangement of the vulcanizer, substantially as described, whereby the process of vulcanization is carried on and effected in the same vessel or chamber in which the water is contained.

Second, I claim a plug or disk in combination with a vulcanized chamber, substantially as and for the purpose set forth and described.

37,524.—Cheese Vat.—H. A. Roe, Madison, Ohio:

First, I claim the combination with the heater and vat, of a valve or valves, arranged within the heater, and so as to close against the wa-

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ter in the vat or pipe or pipes leading from the heater thereto, substantially as specified.

Second, The employment of two or more valves in connection with the heater and vat arranged to control the supply to the vat on opposite sides of it, substantially as set forth.

Third, So arranging the valves which control the supply of hot water to the vat as that they shall close simultaneously, and when closed any pressure in the heater will act to prevent rather than force the circulation, and when released by handle, h, rod, g, and elbows, i j, the valves will open by their own gravity, substantially as specified.

Fourth, The combination with the milk vat, F, and the slats, H H H, of the inverted distributing trough, J J, substantially as and for the purposes specified.

37,525.—Counter-shaft.—C. G. Shaw, of Florence, Mass.:

I claim the combination of the loose cone pulley with the shaft, A, in the manner and for the purpose substantially as specified.

[This invention consists in combining a loose cone pulley with a counter-shaft, upon which it is fitted by means of two bevel gears, one of which is fast to the pulley, and another fastened on the shaft, and a third bevel gear to transmit motion from one to the other of the two first-mentioned, whereby the loose cone pulley and the shaft are caused to rotate in opposite directions, and a backward and forward motion of the pulley can be obtained by shifting the driving belt to and from a pulley fast on the shaft and a pulley fast to the cone.]

37,526.—Pattern for Cutting Boots.—Elias Shopbell, Ashland, Ohio:

I claim the plate, A, in combination with the pairs of plates, B B′, C C′ and D D′, with their respective slots and angles, producing the simultaneous movement of the several pairs of plates and the consequent unequal enlargement and contraction of the pattern, substantially as set forth.

37,527.—Pattern for Cutting Shoes and Gaiters.—Elias Shopbell, Ashland, Ohio:

I claim the vamp pattern with its articulation, c, and the several slots governing the simultaneous and proportional extension of the pairs of plates, B B′, C C′, constructed as specified, in combination with the quarter pattern constructed as described, and having a corresponding and simultaneous proportional extension corresponding to that of the vamp pattern, as herein set forth.

37,528.—Window-sash Fastening.—M. B. Stafford, New York City:

I claim the pivoted bar, B, provided with the notch or recess, c, and having the bar, C, attached by a joint, d, in combination with the plate, D, provided with the ledge, f, having inclined or curved surfaces, g g, and the slot, h, and also provided with the curved ledge, i, all arranged as and for the purpose set forth.

[This invention relates to an improvement in that class of window-sash fastenings which are designed for keeping the upper and lower sashes in a locked state when closed. And consists in a novel attachment constructed and arranged in such a manner, with a fastening, that when the latter is moved or adjusted so as to fasten the sashes the attachment will become engaged, or so adjust itself as to form a lock, and so effectually prevent the fastening being operated upon from the outer side of the window.]

37,529.—Lantern.—John Straszer, St. Louis, Mo.

I claim the combination of the hinge and spring catch, when applied to lanterns, substantially as and for the purpose set forth.

[This invention consists in a novel way of securing the bottom of the lantern, which contains the lamp, to its upper part, whereby the parts cannot become detached and the lamp portion lost or mislaid, a contingency of frequent occurrence in using ordinary lanterns—the invention, at the same time, admitting of the lamp being very readily exposed when it is required to be lighted or extinguished.]

37,530.—Machine for Rossing Bark.—B. F. Taber, Buffalo, N. Y.:

First, I claim the combination of the yieldingspring pressure-plate, C, with the feed cylinder, B, for the purpose substantially as described.

Second, The arrangement and combination of the rossing knife with the adjustable levers, I J K, for the purpose substantially as described.

Third, The combination of the breaker, Q, fingers, R, and plate, O, with the feed cylinder, B, for the purposes and substantially as set forth.

Fourth, I also claim the combination of the spring flap, L, with the pressure-plate, C, and feed cylinder, B, for the purposes and substantially as set forth.

37,531.—Calipers.—D. C. Talbot, Worcester, Mass.:

I claim, first, The method of applying a graduated scale or measure attached to calipers or dividers, substantially as described.

Second, The movable hand or indicator, B, attached to or moved by the arms of calipers or dividers, substantially as specified.

37,532.—Cultivator.—J. A. Throp and John Cox, Three Rivers, Mich.:

I claim the arrangement of the shovel legs on pivots, in combination with a laterally-adjustible frame, or its equivalent, swivelling connecting or stay rods and yielding connections or wooden pins, substantially in the manner and for the purposes described.

Second, The flexible or jointed frame, H, or its equivalent, in combination with the swivelling stay rods, h, legs, I I, cross bars, A′ A″ A‴, and the cultivator, A; all constructed substantially in the manner and for the purpose described.

Third, Adapting the cultivator to the double use of "seaming" and "hilling" by the combination of a stiff frame, a jointed, pivoted frame, H, and adjustable steps or pins, a a, substantially as set forth.

Fourth, The jointed frame, H, in combination with a rigid frame, when the frame, H, is pivoted at its front ends and supported by a guide at its rear end, substantially as described.

Fifth, The arrangement of the stay rods, h, and the legs, I I, in combination with a frame, H, which turns on a different fulcra from those on which the stay rods turn, substantially as set forth.

37,533.—Kettle for Culinary Purposes.—D. H. Tuxworth, Sen., Baltimore, Md.:

I claim, first, The kettle, A, provided with the tube, D, in combination with the lamp chimney, E, the latter being arranged with the tube, D, to operate as and for the purpose set forth.

Second, The tube, F, when used in connection with the tube, D, and lamp chimney, E, and applied to the kettle, A, and tube, D, as and for the purpose herein set forth.

[This invention consists in combining a kettle with a coal-oil lamp in such a manner that water or other liquids may be expeditiously heated and boiled. The invention is more especially designed for making tea and coffee, but may be advantageously used for other culinary purposes which require the process of boiling.]

37,534.—Water Gage for Steam Boilers.—E. W. Vanduzen, Hamilton township, Ohio:

I claim the combination of the valve, d, and cap, D, with the dial index spindle, a, screw, c, and rod, f, all in the manner and for the purpose shown and described.

[This invention relates to that kind of gage which is composed of a a float attached to a lever connected with the spindle of an index which rotates outside of a dial. The principal object of this invention is to make the gage self-draining, and so obviate all danger of injury by freezing, and to obviate the necessity for blowing it out. It consists in furnishing the index spindle with a valve fitted to a seat at the back of the dial, to prevent the escape of steam from the chamber at the back of the dial; also in so applying a cap and set screw at the back of the aforesaid chamber as to provide for the adjustment of the valve to its seat, and for removing the index spindle when desired for repair; and, further, in the application within the boiler of an eye and hook for the suspension of the float during the repair or cleaning out of the boiler.]

37,535.—Water Elevator.—W. B. Wadsworth, Cleveland, Ohio:

I claim, first, The toothed wheel as shown and described.

Second, The wheel in combination with the chain, c b b f f d d, substantially as shown and described.

Third, The tilter, g y, in combination with the flat chain, c b b f f d d, substantially as shown and described.

Fourth, The construction and arrangement of the curved tilter, g y, and stops, h h, substantially as shown and described.

37,536.—Gate.—D. R. Warfield, Muscatine, Iowa.

I claim the employment of the centrally-pivoted double-angle rail, B, in combination with the gate, A, wheels, a a, and levers, E F, in the manner shown and described.

[This invention relates to an improvement in that class of gates which are constructed and arranged with a view to admit of being opened and closed by a person in a vehicle or by a rider on horseback.]

37,537.—Knife-cleaning Machine.—George Weedon, New York City.—Patented in England, Nov. 9, 1857:

I claim the combination of reversible holders, scouring board and holdfast, substantially as described and substantially for the purpose set forth.

37,538.—Condensing Tube.—Silas Wilson, Auburn, N. Y.:

I claim, first, Constructing the tube with a curved passage substantially as and for the purpose specified.

Second, Lining the tube, B, with a curved piece of glass tubing, A, substantially as described.

37,539.—Water Wheel.—Albert Winton, Frederick county, Md.:

I claim, first, The construction of a turbine water wheel, b b b b e e e, formed with a close, horizontal diaphragm or partition, c c, and hub, d d, the buckets or floats, g g g g, whose outer, vertical edge, longitudinally, is slightly curved, as at h h h h, said buckets or floats arranged or standing relative to the center or axis of the wheel at an angle of 14 degrees, and whose lower part is the arc of a quarter circle, as at i i i, and continuing sloping downwardly at an angle of 22 degrees, as at j j j j, and likewise inclining outwardly at an angle of about 3¼ degrees as at K K K K, Figs. 1 and 4, so that the inflow of water may be received from and in the direction substantially in the manner as set forth and described.

Second, I also claim the cap covering, t t t t t, formed with a circular rabbet or shoulder, u u u u, and the suspending sleeve or hollow column, v v v v w w w w, with the adjustable step or casing collar, x y z a″ a″ a‴, combined and arranged substantially as shown in Figs. 1 and 5, and as set forth.

Third, I also claim the mode of suspending the wheel, through means of the adjustable collar, b″ b″ b″ b″ c″, as shown in Figs. 1 and 5, and as set forth and described.

Fourth, I also claim the construction of the peculiar surrounding adjustable gate, f″ f″ f″ f″, g″ g″ g″ g″, formed with the chute guides, h″ h″ h″ h″, Figs. 1 and 4, substantially as set forth and described, and in combination with the wheel, as shown in Figs. 1 and 4.

Fifth, I also claim the special arrangement of the vertical chute guides, K″ K″ K″ K″, at the angle of 13 degrees, and when so arranged around the circumference of the wheel and buckets thereof, as to divide the inflow of the main volume of surrounding water into numerous small columns, one-third greater in number than the number of buckets, and whereby the said columns strike the surface of the buckets nearly, or quite, at right angles thereto, substantially as in the manner set forth and described.

37,540.—Lamp Burner.—Homer Wright, Pittsburgh, Pa.:

I claim, first, Arranging the wick-tube, B, in such a manner that it may be canted or inclined and its upper end brought in or made to project through an opening, h, in the burner, substantially as and for the purpose set forth.

Second, The hinged socket, C, in combination with the plate, D, door, E, and slotted plates, e e, arranged as shown, and used in connection with and applied to the wick-tube, B, to operate or adjust the latter, as and for the purpose specified.

Third, The lip, j, at the lower end of the opening, h, in the burner, in connection with the slots, k l, in the plate, D, for the purpose of retaining the wick-tube, B, in the two positions described.

37,541.—Manufacture of Braid.—A. H. Boyd, Medway, Mass., assignor to himself, John Orvis, Roxbury, Mass., J. J. Cobb, Boston, Mass., and J. M. Sterling, Cleveland, Ohio:

I claim the new manufacture which I have called "Amosine braid," constructed substantially as described.

37,542.—Giffard's Injector.—Nathan Cope (assignor to Ezra Cope), Cincinnati, Ohio:

I claim, first, The described arrangement of the secondary water supply, to the Giffard injector, as set forth.

Second, I also claim the supplying of a portion of the water of a boiler-feeder, by a jet of water that has momentum imparted to it by a jet of steam, said water jet acting upon the water of the secondary supply, as described.

Third, I further claim the waste-pipe, K, in combination with secondary water supply, G, which may be opened, or closed, at pleasure, for the purpose of regulating the action of the injector, substantially as and for the purpose set forth.

37,543.—Machinery for Cuttting Corks and Bungs.—Jedediah Lavins, Norwich, Conn., administrator of the estate of W. R. Crocker, late of said place, deceased:

I claim, in combination with a rotating knife, the griping and rotating apparatus which feeds the corks to the knife, substantially as described.

I claim the feeding wheel, L, for the purpose of feeding the corks to the griping spindles, substantially as described.

And, in combination with the feeding wheel, L, I claim the mechanism described, or its equivalent, for turning and holding the feeding wheel.

37,544.—Breech-loading Fire-arm.—Jarvis Davis (assignor to Patrick Smith), Buffalo, N. Y.:

First, I claim the combination of the spring hook, G F, with the hammer, E, the said spring hook being connected to and operating with the hammer, for the purposes and substantially as described.

Second, I claim the sliding abutment, J, having a slot, j′, therein when arranged and used as described.

Third, I claim the recess or chamber, i, made in the breech, for the purposes and substantially as set forth.

37,545.—Steam Valve.—G. S. Faulkner, Stafford, Conn., assignor to O. T. Earle, of Springfield, Mass.:

I claim, first, The hollow, cylindrical valve, I, having the several parts arranged and combined and operating substantially in the manner and for the purpose described.

Second, A steam chest constructed with the ports, D E P′′′′ and G H, and with a straight cylindric bore, in combination with a hollow cylindric valve with the ports described, and fitted into said chest so that a steam joint, practically, is formed, substantially as set forth.

37,546.—Weaving Corsets.—B. J. Goullioud, Paris, France, assignor to Solomon and Adolph Ottenheimer, New York City.—Patented in France, July 4, 1861:

I claim a lay and shuttle boxes formed substantially as specified, in combination with a shuttle that delivers its thread at or near one end, and is in length about one-third of the breadth of the lay, whereby the shuttle, when thrown in one direction shall cause little or no thread to unroll from the bobbin, for the purposes and as specified.

37,547.—Loom for Weaving Corsets.—B. J. Goullioud, Paris, France, assignor to Solomon and Adolph Ottenheimer, New York City.—Patented in France, July 4, 1861:

I claim a series of sleeves, a′, surrounding the shaft, a, and receiving the sections of the take-up rollers and the gears or pulleys for actuating them at the respective ends of said sleeves, as and for the purposes specified.

37,548.—Purifying and Cleansing Sugar.—G. A. Jasper (assignor to The Union Sugar Refining Company), of Charlestown, Mass.:

I claim combining with the process of cleansing sugar by centrifugal action, in the centrifugal machine, a means or process of forcing the cleansing liquid or sirup in one or more fine jets or streams under high pressure or velocity, against the mass of sugar in revolution, the whole being substantially as described.

37,549.—Grain and Straw Separator.—Alexander Major (assignor to himself and W. M. Major), Lebanon, Pa.:

I claim subjecting the straw to a longitudinal and a lateral undulating motion, along and across a stationary partition, by means of a vibrating apron made in two or more sections, and operated substantially as set forth.

37,550.—Machine for Making Ruffles.—J. A. Pipo, New York City, assignor to himself and S. S. Sherwood, Acquackanonck, N. J.:

I claim the combination with a sewing machine of the guide, 6, the guides 4 and 5, or a double guide in their place, intended to form two folds of a single piece of cloth, and the pawl, 7, substantially as described.

37,551.—Revolving Fire-arm.—F. P. Slocum (assignor to S. W. Slocum), of Brooklyn, N. Y.:

First, I claim the cylinder constructed with lids, b b, to its several chambers, opening in such manner as to permit the cartridges to be introduced, and the discharged cartridge cases to be taken out sideways, and with a closed or solid breech, substantially as specified.

Second, The ring, C, applied in combination with the cylinder and the lids, a a, of the chambers, substantially as and for the purpose specified.

Third, The combination with the ring, C′, of one or more stops, j k, in the frame, substantially as and for the purpose specified.

37,552.—Machine for Cutting Files.—A. B. Southwick (assignor to Whipple Manufacturing Company), Ballard Vale, Mass.:

First, I claim the pivoted or vibrating block, L, in combination with the sliding frame or box, K, operating substantially as described.

Second, I claim the swinging frame, F, with the weighted rod, G, or its equivalent, for holding the blank up to the face-plate, E, substantially as set forth.

Third, I claim the standard, C, and platform, D, pivoting on the center, c, and made adjustable in the manner substantially as specified.

Fourth, I claim the device for regulating the blow of the cutter, r, as the feed proceeds, viz., the wedge-shaped rod, F, which is raised with the blank, b, and the tapering block or wedge, w, for lowering the stop, v, substantially as set forth.

Fifth, I claim the piece, a″, inserted in the face-plate, E, for the purpose stated, and in the manner substantially as described.

37,553.—Coal-oil Lantern for Railroad Cars, &c.—S. B. H. Vance (assignor to Mitchell, Vance & Co.), New York City:

I claim the perforated cone, E, in combination with the chamber, F, and draught chimney, F′, applied to the lantern, A, as and for the purpose set forth.

[The object of this invention is to obtain a coal-oil lantern or lamp for railway cars, steamboats and similar places, where the flame is exposed to draughts of air. Coal-oil lanterns or lamps have not hitherto been successfully used for such purposes, owing to the sensitiveness of the flame, and the liability of the same to smoke, on account of downward or back draught, and an unequal supply of air.]

37,554.—Machine for Cutting Files.—M. D. Whipple, Cambridgeport, Mass., assignor to the Whipple File Manufacturing Co., Ballard Vale, Mass.:

I claim the central rest or block, B, with its jaws or nippers, D D′, for holding the file blank, in combination with the feed mechanism for feeding the blank, and the several cutters, X, each of which cuts one face of the file during a single feed, substantially as specified.

37,555.—Mode of uniting Metal Surfaces.—W. B. Barnard (assignor to himself and S. G. Blackman), Waterbury, Conn.:

I claim the new and improved method of uniting metallic sheets or plates, by means of metallic rivets combined with simple apertures in the outer facing sheets, and interiorly enlarged cavities in the underlying plates of metal, all substantially in the manner and for the purpose herein set forth.

When my invention is used for the purpose of protecting the hulls of iron-plated vessels, I also claim the introduction of wooden strips, y y, Fig. 4, in combination with the iron strips, x x, the iron surface, D, and the riveted metallic facing, B, in order to obtain a uniform exterior surface, substantially in the manner herein set forth.

37,556.—Loom for Weaving Corsets.—William Breitenstein (assignor to Fischel & Co.), New York City:

I claim the employment in looms of a take-up mechanism which takes up portions of the breadth of the cloth, independently of the other portions of the breadth, in the manner substantially as herein specified.

Second, Regulating or determining the action of the several parts of such irregular take-up by the differing force of the impact of the lay on the different parts of the breadth of the cloth, in the manner substantially as herein set forth.

Third, The employment in a loom of a multiple roller, substantially as herein described and represented by K K L, for the purpose set forth.

Fourth, Imparting a yielding force to the several sections of such roller so as to maintain a constant or nearly constant tension on all parts of the breadth of the cloth during the weaving of corsets and the like irregular articles, substantially as specified.

Fifth, The combination of suitable pawls, K′, with the ratchet wheels, K, and shaft, L, and frictional connections, n, or their respective equivalents, for the purpose herein set forth.

Sixth, The employment in looms for weaving corsets and other irregular cloth of the filling stretcher, operating substantially in the manner and for the purpose herein set forth.

Seventh, Controlling the operation of the filling stretchers, B R, by the movement of the stop, W, or its equivalent, substantially as and for the purpose herein set forth.

37,557.—Projectile for Ordnance.—C. W. Stafford, Burlington, Iowa:

I claim, first, a sub-caliber shot or shell formed with a cutting face of iron or steel, and surrounded with a cylindrical casing of wood or other light material adapted to the bore of the gun, and formed, applied and secured in any manner substantially as herein set forth.

Second, The cap, C, employed in the manner described, to secure the rear end of the casing, B, support and guide the rear end of the projectile within the bore and afford means for the attachment of the packing ring, D.

Third, The cap, G, employed in the manner described, to secure the forward end of the casing, B, support and guide the front of the projectile within the bore and effect the explosion of the charge by resistance against the surface of a body penetrated by the bolt, A.

37,558.—Ice-creeper.—William Field, Providence, R. I.:

I claim, in combination with the bar, A, ears, a a, and strap, E, or any substantially equivalent means of attachment to the heel of the boot or shoe, the claw, C, constructed in the manner described, with a double row of teeth, b b, to prevent forward, backward and lateral slipping, and a spur, D, projecting upward through or above the bar, A, and adapted to penetrate the heel, as hereinbefore explained.

[An illustration and description of this invention appeared in our last week's issue, page 96, Vol. VIII., of the Scientific American.]

RE-ISSUES.

1,388.—Wooden Sieve for Gas-purifiers.—N. O. Hawxhurst, Manat Hill, N. Y., assignor to William Combe, New York City. Patented October 21, 1862:

I claim a wooden grating made with apertures between the bars thereof, expanding downward, in lime purifiers of gas-works, constructed substantially as and for the purposes set forth.

1,389.—Lock and Latch.—Charles A. Miller, Philadelphia, Pa., assignee of W. S. Kirkham, Branford, Conn. Patented June 11, 1861:

I claim, first, So dividing the hub or follower and so combining the same with a reversible latch, that the arms, or their equivalents, of the divided hub or follower may be released for the purpose of allowing the latch to be reversed or turned.

Secondly, So constructing and arranging the individual parts of a divided hub or follower, that the reversal or turning of the latch is prevented only by the presence of the spindle within the lock.

DESIGNS.

1,705.—Design for a Stove.—A. E. Chamberlain (assignor to Chamberlain & Co.), Cincinnati, Ohio.

1,706.—Design for a Floor-cloth.—James Hutchinson (assignor to J. E. Whipple), Lansingburgh, N. Y.

1,707 to 1,718.—Twelve Designs for Carpet Patterns.—H. G. Thompson, New York City, assignor to the Hartford Carpet Co., Hartford, Conn.

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EXTENSION.

6,027.—Hot-air Register.—E. A. Tuttle, William Tuttle and J. S. Bailey, New York City, assignees of C. F. Tuttle, deceased. Patented January 23, 1849. Re-issued Oct. 14, 1862 :

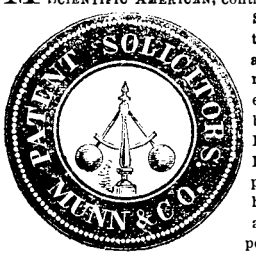
We claim the application of the upright or vertical wheel, G, or part or segment of a wheel, to the opening and closing of hot-air registers or ventilators, the edge or periphery of which wheel is so placed as to adapt it to be operated on by the foot if desired, substantially as set forth.

This invention consists in placing at the side of the register-box a wheel, or segment of a wheel, the top of which comes flush, or nearly flush, with the upper surface of the fret-work, and is so connected with the fan that motion imparted to the wheel by the foot will actuate the fan and open or close the register. The advantages claimed for it are, simplicity of construction, ease of operation and prevention of all liability of burning of the fingers, which is the common defect of other styles of registers.

IMPORTANT TO INVENTORS.

PATENTS FOR SEVENTEEN YEARS.

MESSRS. MUNN & CO., PROPRIETORS OF THE SCIENTIFIC AMERICAN, continue to solicit patents in the United States and all foreign countries, on the most reasonable terms. They also attend to various other departments of business pertaining to patents, such as Extensions, Appeals before the United States Court. Interferences, Opinions relative to Infringements, &c. The long experience Messrs. MUNN & Co. have had in preparing Specifications and Drawings, has rendered them perfectly conversant with the mode of doing business at the United States Patent Office, and with the greater part of the inventions which have been patented. Information concerning the patentability of inventions is freely given, without charge, on sending a model or drawing and description to this office.



THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent free of charge. Address MUNN & CO., No. 37 Park Row, New York.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh streets, Washington, by experienced and competent persons. Many thousands such examinations have been made through this office. Address MUNN & CO., No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one ; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents ; but, if not convenient to do so, there is but little risk in sending bank-bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

The revised Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the Government fee required on filing an application for a patent is *reduced* from **$30 down to $15.** Other changes in the fees are also made as follows :—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (but in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

During the last seventeen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the inventors throughout the country, we would state that we have acted as agents for at least TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees at home and abroad. Thousands of inventors for whom we have taken out patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the inventors whose patents were secured through this office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive offices, and we are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat, under the new law, is $10. A pamphlet of advice regarding applications for patents and caveats, printed in English and German, is furnished gratis on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

ASSIGNMENTS OF PATENTS.

Assignments of patents, and agreements between patentees and manufacturers are carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

It would require many columns to detail all the ways in which inventors or patentees may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the rights of patentees will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park Row, New York.

REJECTED APPLICATIONS.

We are prepared to undertake the investigation and prosecution of ejected cases on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief story of the case, inclosing the official letters, &c.

FOREIGN PATENTS.

We are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business we have offices at Nos. 66 Chancery lane, London ; 29 Boulevard St. Martin, Paris ; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through the Scientific American Patent Agency, No. 37 Park Row, New York.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through our Agency, the requirements of different Government Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park Row, New York, or any of our branch offices.

Notes and Queries

W. B. S., of Wis.—Your proposed system of electro-magneto-helices for an Atlantic cable will not operate ss you suppose. The great difficulty with marine cables is to obtain sufficient and proper insulation. We advise you to make some experiments on a limited scale and determine the question for your own satisfaction.

W. C. B., of Conn.—Your father's experiments do not possess sufficient novelty to bring them into notice at the present time. We have had our columns full of this kind of matter lately.

D. McJ., of C. W.—It will require about 2,000 cubic feet of gas to raise a man of 180 pounds weight in a balloon. You cannot make a flying machine on the plan you have described or any other that has been brought to our notice. You may blow off steam at any pressure from your boiler. We prefer to lift the safety valve and blow off steam gradually. You cannot pump steam back to the boiler by employing any specific valve whatever in the pump for the purpose of using the exhaust steam over again. It is also evident that it would take just as much power to force back the steam into the boiler as the power you could obtain in working it over again, so there would be no saving whatever in recovering such steam.

J. N. Z., of Kansas.—If you burn the ends of your fence posts so as to char their surface or coat them with coal tar to the depth they are to be covered in the ground, they will last twice as long as posts put in without any preparation in the common manner.

G. W., of Ky.—The temperature of steam is not, as a rule, the same at all pressures; steam can be superheated so as to become almost inflammable or "red-hot" as it is called by engineers.

F. G. W., of Mass.—For ordinary purposes the upright flue boiler is about as good as any you can get; they are in very extensive use; all steam fire-engines have them. The plan of boiler you have sent us is very old ; the water space is rather narrow, but this makes no difference provided the feed-water circulates properly. Put all the flues or tubes that you can into your boiler without weakening it. Every tube you put in saves money hereafter, but you must be careful and see that the feed-water has free access to all parts of the heating surfaces, as boilers constructed with large amounts of the same are liable to "foam."

E. M., of N. Y.—One kilogramme is equal to 2,205 pounds, 15,000 kilogrammes are equal to 33,075 pounds; 25,000 kilogrammes are equal to 55,125 pounds. One meter is equal to 3·281 feet, and a millimeter is the 1-1000th part of a meter. From these data you will be able to compare the strength of the different kinds of iron you refer to, in the article which you submit to us.

C. C., of D. C.—We have given you all the information we possess respecting the treatment of artificial stones with the chloride of calcium. Make some of the calcium fresh and try it yourself. It is manufactured by dissolving marble dust in muriatic acid.

R. D. D., of Iowa.—From the section diagram which you have forwarded of your type machine we cannot perceive any features of a new and important character. There are several type-setting and distributing machines in operation in this city, all of which are operated by keys like those of the House telegraph.

W. G., of Conn.—The best air pump, for your purpose, that you can make, is one of the cylindrical kind, with a small brass cylinder and piston like a water pump. You will find it difficult to operate in forcing the air against a pressure of 100 pounds on the inch.

A. J., of N. Y.—Pure india-rubber may be dissolved in turpentine or naphtha, but it is difficult to use as a cement for repairing vulcanized boots and shoes. In the manufacture of india-rubber articles the india-rubber is rendered soft by heat and pressure—not dissolved in a solvent.

H. W. B., of N. Y.—A submarine propeller is illustrated and described on page 81, Vol. VII (old series) of the SCIENTIFIC AMERICAN. We think you will consider it superior to the one which you propose for making submarine explorations, and for attacking the war ships of an enemy by placing torpedoes under them.

A. S., of Ohio.—On page 53, current volume of the SCIENTIFIC AMERICAN, in the column of "Valuable Receipts," you will notice that we have described the muriate of zinc as one of the fluxes used in soldering.

H. and R., of C. W.—Cast iron articles are malleable-ized and thus rendered soft and tough, by placing them in a properly-constructed furnace, covering them with an oxide of iron, such as some iron ore, and submitting them to a red heat, which is continued for several days, after which they are gradually cooled. "Cold short" cast iron articles are unfit for being malleable-ized. You must use a good quality of pig iron for all your castings.

F. J. C., of Philadelphia.—You propose, as a superior boiler for generating steam, one constructed on the principle of the centrifugal drying machine, into which a small quantity of water shall be conveyed and sprinkled over an extensive heating surface. Your proposition has been suggested on several occasions. You will find a rotary boiler illustrated and described on page 217, Vol. II (old series) of the SCIENTIFIC AMERICAN; also an illustrated history of steam boilers in Vol. VII (old series) of the SCIENTIFIC AMERICAN, in which you will obtain much valuable information on the subject of steam boilers.

A. P. J., of Ill.—Some years ago we examined a very good quality of paper that was made from cotton wood. We have no doubt but good paper may be made at a moderate cost from such wood, as it is very fibrous and contains but little silicious matter.

J. B. C., of Ill.—An intense black India ink for writing on vellum is made with a very strong solution of good Indian ink. You have probably used a weak solution which affords a foxy black ink.

J. H. G., of N. Y.—Your particular machine for performing music with a galvanic battery may be patentable, but the principle of executing music with an electrical apparatus is not patentable, as this was done years ago and a patent taken out for the invention by Alexander Bain. Fine iron wire is not equal to copper in making an electro-magnet of intensity or one for a magneto-electric machine.

Money Received

At the Scientific American Office, on account of Patent Office business, from Wednesday, January 28, to Wednesday February 4, 1863 :—

G. T. L., of Pa., $22 ; P. J. C., of Conn., $20; H. B., Jr., of N. Y., $40; S. T. S., of Mass, $20; J. H. A., of N. Y., $16; T. S., of Conn., $56; R. H. J., of Ill., $20; S. M. D., of Mass., $20; J. C. H., of Conn., $20; J. T. M., of N. Y., $20; H E. P., of Mass., $20; C. P., of Md., $16; F. R. T., of Me., $25; H. R., of Mass., $10; M. H., of N. Y., $15; J. K., of Conn., $32; J. B. W., of N. J., $15; S. B. E., of Conn., $25; G. B., of England, $45; J. R. H., of N. Y., $40; F. C. K., of N. Y., $20; S. R., of N. Y., $16; J. H. S., of N. Y., $15; G. E., of Ohio, $45; E. F., of N. Y., $40; G. W. N., of Mass., $20; G. B. O., of N. Y., $31; S. C. H., of Mass., $20; G. S., of N. Y., $26; R. R. F., of Ill., $26; S. B., Jr., of N. Y., $26; J. B. T., of Pa., $29; R. C. R., of N. Y., $356; A. T. W., of Ind., $15; L. R., of N. Y., $15; J. H. S., of Ill., $15; W & P., of Ohio, $20; D. Van H., of Ind., $20; C. G., of Mass, $20; J. A., of N. Y., $20; T. B. V., of N. Y., $15; L. D. C., of Mich., $20; R. S., of N. Y., $16; T. W. B., of N. J., $20; L. O. C., of Pa., $20; C. E. P., of Mass., $45; W. D. S., of N. Y., $16; E. E., of Cal., $10; J. F. B., of Wis., $25; E. P., of Ill., $25; E. H. C., of Mich., $25; F. P F., of N. J., $16; J. B., of Ind., $15; J. A., of Ky., $10; G. D., of Mass., $15; C. A. & Co., of Ct., $392; E. C., of O., $25; L. & W., of N. Y., $150; P. M., of France, $34; A. S., of Conn., $16; T. W., of Ill., $12; G. R., of Ky., $16; T. H. B., of N. Y., $25; D. & S., of N. Y., $250; E. H., of Cal., $100; J. C. H., of Mass., $16; J. W. B., of Ill., $25; T. D. R., of N. Y., $30; B. C. C., of Maine, $32; E. B., of N. Y., $26. R. T. A., of Conn., $25; A. H., of Iowa, $30.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it, and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, and inform us the amount, and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from Wednesday, January 28, to Wednesday, February 4, 1863 :—

T. S., of Conn.; C. W. G., of N. J.; G. B. O., of N. Y.; E. F., of N. Y.; J. R. H., of N. Y.; A. B., of N. J.; L. & B., of N. J.; G. T. L., of Pa.; S. J. S., of N. Y.; J. H. A., of N. Y.; J. W. S., of N. Y.; G. S., of N. Y.; S. B. Jr., of N. Y.; J. W. B., of Ill.; R. F. A., of Conn.; B. C. C., of Maine (2 cases); P. M., of France; M. and G., of Ill.; T. H. B., of N. Y.; E. C., of Ohio; E. B., of N. Y.; S. B. E., of Conn.; T. W., of Ill.; F. D., of Conn.; W. S. P., of Mich.; L. R., of N. Y.; S. S. W., of Pa.; E. H. C., of Mich.; F. B. T., of Wis.; R. R F., of Ill.; E. E., of Cal.; J. F. B., of Wis.; W. D. Jr., of Pa.; E. P., of Ill.; A. H., of Iowa; R. H. of Vt.

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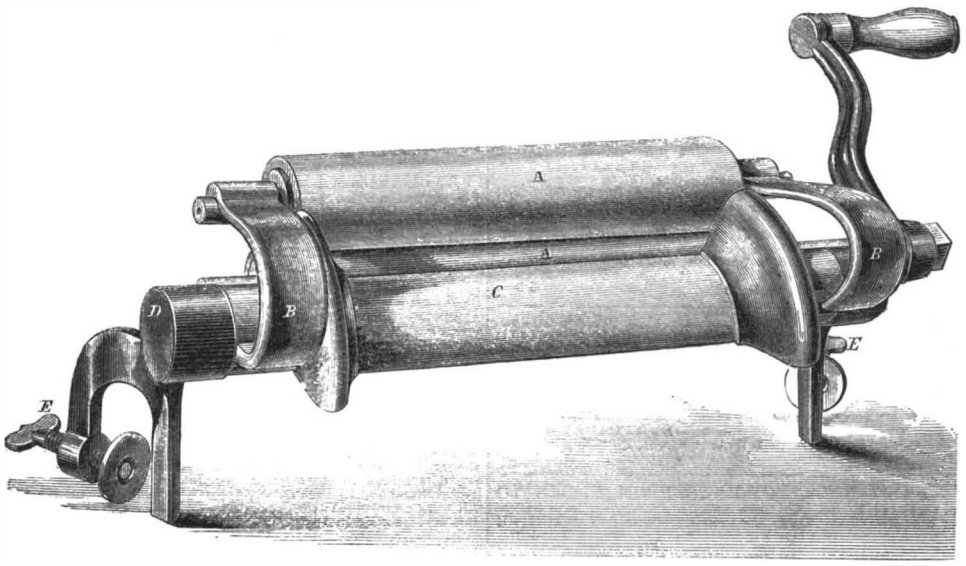
Improved Clothes-squeezer.

The severest labor of a washing-day is the wringing of the moisture out of the garments so that they may become clean and dry speedily. Some benefactor of his race (to whom the female portion ought to erect a monument) discovered that the water might be driven out by pressure, and consequently, there have been many machines for the purpose alluded to, made upon this principle. We illustrate this week another one, which has some very excellent features. The two rollers, A, are covered with vulcanized-rubber, and have short axles upon



SWIFT'S PATENT CLOTHES-SQUEEZER.

either end, which run in bearings formed for them in the springs, B; they are operated by the crank projecting at one side. These springs are shaped like the letter U, placed horizontally, and are made very stiff and strong, sufficiently so to exert a powerful pressure on any substance introduced between them. The wooden portion, C, is attached to the legs, D; these are fastened to the wash-tub by the thumb-screws, E; by means of the latter the squeezer can be quickly and easily secured in its place, and is then ready for use without further adjustment. All articles, whether thick or thin, can be squeezed between the rollers without injury, it is stated, to the most delicate fabric. The rollers "give," as the garments run through them, and the springs admit of much elasticity of movement. We have one of these machines in our family, and it is very much liked by those who use it. This invention was patented January 28, 1862. Further information respecting it may be obtained by addressing the assignee, M. J. Cluff, 288 Washington street, Boston.

Origin of Petroleum.

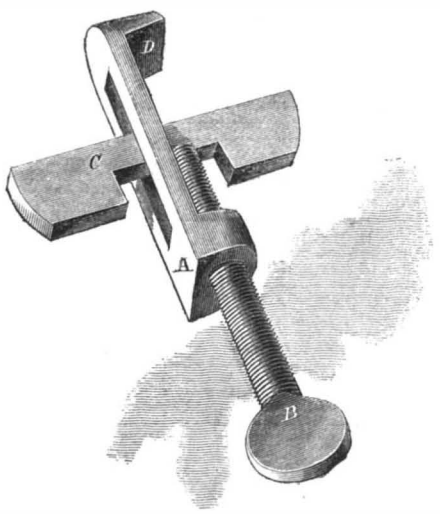
Dr. J. B. Edwards, in the *Pharmaceutical Journal*, remarks that the flow of oil from mineral springs is by no means new, either to science or commerce. Herodotus has recorded that the island of Zante furnished large quantities, while Pliny and Dioscorides describe the oil obtained from Agrigentum, a small town of Sicily. The Persian springs at Bakoum have yielded to the value of 600,000 dollars annually, and the earth oil from Rangoon, in Burmah, has been exported to the extent of 400,000 hogsheads yearly. The streets of Genoa and Amiens were formerly lighted by a petroleum obtained from Parma. In 1847 a spring was discovered in Yorkshire, which was successfully worked by Mr. James Young, of Glasgow, until exhausted, when he turned his attention to the distillation of coal, and discovered paraffine oil. The marvelous oil-springs of the New World, however, far surpass in extent and interest all previous discoveries, and the quantities already yielded, without apparently diminishing the supply, show that this will be a most important article of commerce for some years to come.—*English Paper.*

To Make Strawberry Wine.

Pick the berries carefully over, take out the stems, so that nothing remains but the pure ripe fruit; then press out the juice, to which add an equal quantity of water and four pounds of brown sugar to the gallon, put in a barrel and let it ferment six weeks, then lightly bung and stand two months, when the bung is to be driven in tight—let it stand until the middle of May, when it can be bottled. When fermenting, the vessel must be kept full, so that it can work over. To fine the wine an ounce of isinglass put in six gallons of the wine, at the time the bung is driven in, will answer a good purpose. The calyx of the strawberry imparts to the wine a very unpleasant taste, and is doubtless the cause of previous failures. Several samples at the last Fair of the State Horticultural Society were thus ruined. Currant wine is made in the same manner, but the stems need not be taken out. In the making of currant wine no water should be used; in that case two and a half pounds of sugar to the gallon is sufficient. We have never made wine from the strawberry, but like the currant, we have no doubt that it would be all the better not to use any water in it. In that case less sugar would be required, and the wine would have more body and less stimulating or alcoholic properties. Wine from the raspberry and other small fruits are made in the same general way. The more of the properties of the fruit and less of alcohol should be the criterion in the making of all domestic wines.—*Illinois Farmer.*

FRAZER'S PATENT DOOR-FASTENER.

All persons deem it desirable to secure the doors of their dwellings safely. Where doors are furnished with locks, this desideratum is attained by simply



turning a key by the inmates. If there are no locks, however, we must resort to some other plan or contrivance. Travelers, especially, are often subjected to inconvenience, and perhaps danger, when in strange places, by reason of the absence of any protection against intrusion, other than the door itself. We here illustrate a very simple contrivance, which will most effectually keep all undesirable intruders from our rooms or offices. It consists of the slotted brass link, A, provided with a head, D, upon one end, and a boss for the reception of the screw, B, upon the other. The gib, C, is inserted in this slot, as shown by the engraving, and has a recess cut out on one side of it. The operation of the device is as follows:—The head, D, should be hooked into the mortice into which the catch of the lock works; the door is then closed, and the thin part of the link, A, remains between the door and the frame of the same; the gib, C, is then inserted in the slot and the thumb-screw set up to it; by this means all persons on the wrong side of the door are effectually kept there until the fastener is removed. The gib can be reversed when the nature of the lock upon the same requires it, and the fastener can be used in connection with, or independent of, any other fastening with which the door is fitted.

The patent for this door-fastener was procured Sept. 30, 1862, and is the invention of Mr. J. P. Frazer, No. 27 Park Place, New York. The entire patent is for sale, and further information respecting it can be had by addressing him as above.

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FROM THE STEAM PRESS OF JOHN A GRAY

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